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Railroad Brakes.

THE attainment of high speeds on modern railroads lends more and more importance to the question how trains are to be stopped against the frightful momentum they acquire. In England the methods adopted are quite clumsy. The engineer shuts off steam nearly a mile before arriving at a station; and the average distance within which a passenger train is brought to rest is 2,50J feet. In this country, under the same conditions, the distance is only about 1,800 feet. If all the brakemen are at their posts, and simultaneously apply the brakes, it is possible to stop an American passenger train in 600 or 800 feet, as a minimum. But in cases requiring instant action, too much time is lost by the brakemen in getting to the brakes, taking up the slack of the chain, and operating one brake after another. An average loss of thirty seconds in this way would make a loss of a quarter-mile in stopping a fast train. Now, how many cases there are in which this quarter-mile means awful destruction and death!

A few years ago, a device intended, not to supersede, but to complement, in case of imminent peril, the ordinary brake, was introduced into this country. It has steadily made its way into public favor, and is now so generally acknowledged to be efficient and convenient, that we merely echo, in praising it, the universal verdict. This invention is known as the CREAMER SAFETY BRAKE. The accompanying illustration represents a plan and vertical section, which we have prepared at some expense, and carefully drawn to an exact scale, with the aid of which we shall attempt to give our readers a notion of its construction and operation. The hand-wheel, Q, seventeen or eighteen inches in diameter, and the brake-shaft, T, turning in the bracket, R, with the collar, K, the cross-bar, B, constitute an ordinary brake, acting in the usual manner, by means of a chain winding on the brake-shaft, below the platform. In order to understand the nature and operation of the additional parts, the objects to be attained must be kept in view. These may be enumerated as follows:

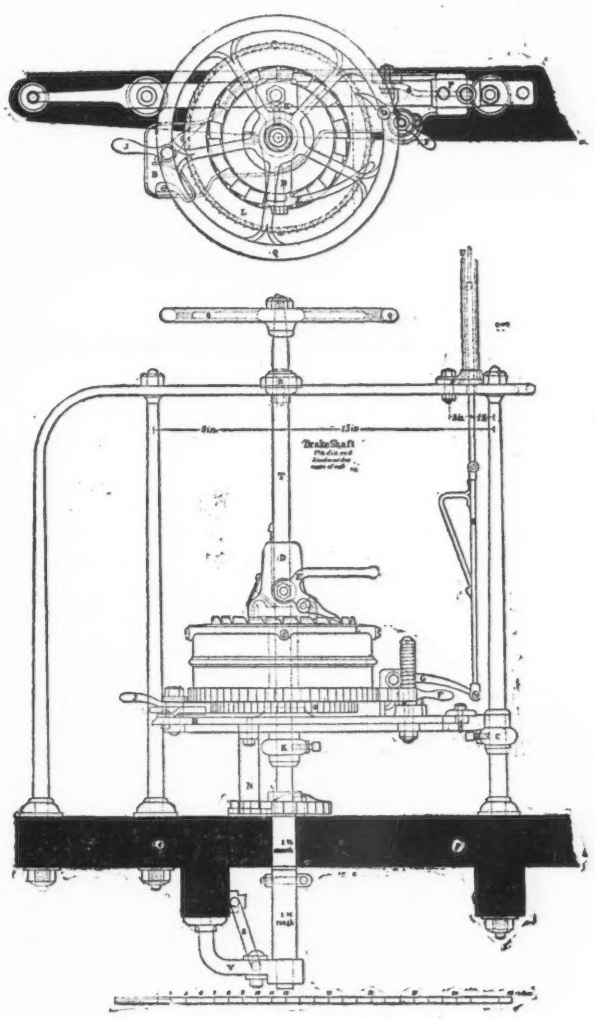
1. It is desired to have a brake, the whole power of which can be instantaneously applied by the engineer, conductor, or brakeman, in case of danger.

2. It is desired that this sudden brake shall not be applied except in case of danger, and that, for all ordinary stoppages, the usual brake-action shall be applied.

3. It is desired that the application of the ordinary brake, while the special brake is set, shall not apply the special brake, but shall leave it ready for action, as before.

4. It is desired that the application or the setting of the special brake shall not interfere with the convenient use of the ordinary brake at any time.

These objects are secured by a few simple and ingenious attachments, the principal one of which is a drum, containing a strong spiral spring, which is equivalent to the power of a brakeman. This is properly called the brake operator. The spring being wound up before the train starts, and held in check during its motion, may be liberated at any time by pulling a cord, and will then develop instantly the power employed in winding it up, and in this way will cause the brake-shaft to revolve, and tighten the chain below, just as if the brakeman had turned the hand-wheel above. The advantage is the gain of time, which, in case of danger, is all important. Let us now examine in detail the operations of the apparatus, in order to show how this end is served without sacrificing the other objects above enumerated.



THE CREAMER SAFETY BRAKE.

The Creamer brake is set by turning the hand-wheel, Q, to the left. At this time, the jointed pawl, E, must be in the position shown in the engraving; otherwise, the brake-shaft would revolve without turning the drum and winding up the spring. At the same time, the pawl, J, catching the ratchet, O, on the drum, must be open; otherwise, the drum and shaft could not be turned to the left at all. The pawl, F, to be operated by the lever, G, offers no resistance to the left movement; but when the wheel has been turned as far as the strength of the brakeman will allow, the pawl, F, catches the drum, and prevents its revolution to the right by reason of the confined spring. It is evident that, when this pawl is released, by pulling up the connecting-rod, H, attached to the lever, G, the drum will revolve powerfully to the right, and by means of the pawl, E, will carry with it the brake-shaft, thus applying the brake. But to stop a train, the brake must not only be applied with force, but the pressure must be maintained. Hence, after the spring is set, the pawl, J, must be closed; and when the spring operates, this pawl will catch the drum and hold it and the shaft at the maximum pressure exerted. In other words, the pawl, J, retains the momentum of the spring. The connecting-rod, H, may be operated through U by a cord leading through the train to the engine, or the brakeman may trip the brake by hand, taking hold, for this purpose, of the bow opposite H.

The function of E, then, is to connect the shaft and drum so that turning the shaft to the left winds up the spring, and turning the drum to the right winds up the chain below. The function of F is to hold the spring when wound up, and the function of J is to hold the chain when wound up to utmost tension. It remains to show how these arrangements operate in permitting the use of the ordinary brake-action.

The illustration shows the patent brake as set. The spring is supposed to be tight, the chain below to be loose, and the train in motion. As we have said, it is not desired to trip the patent brake, except in case of danger, requiring sudden stoppage. In approaching a station, for instance, the brakeman would apply the ordinary brake-action, by simply turning the hand-wheel to the right. The pawl, E, would drag on its ratchet, and the drum would not be moved, being, moreover, firmly held by the pawl, F. The brake-shaft would, therefore, operate independently of the drum. When the chain had reached its utmost tension, the pawl, E, would catch and hold it. On the other hand, to release the brake at any time, it is only necessary to lift the handle of E. The jointed pawls E and J, are recent improvements added to the original invention, and they certainly possess the merit of simplicity and convenience.

The jointed side pawl, F, is connected through U to the main bell-cord in such a way as not to interfere with the purpose of the latter as a signal-rope from the conductor to the engineer. The ingenious arrangement by which this is effected consists mainly of a detaching ring in the cab. Ordinary pulls on the cord merely give signals; a strong pull opens this ring, parts the cord, and causes it to slip through till a ball upon it is caught by a thimble, which occasions a new and greater strain, and trips all the brakes.

The directions furnished to railroad companies by the manufacturers, Messrs. W. G. CREAMER & SON, No. 19 Platt street, New York, seem to reduce the use of this apparatus to a perfect system, and to secure, if carried out, the enforcement of excellent discipline among employés. Several thousand brakes of this pattern are in use on our leading railroads, and furnish a a guaranty of safety to millions of passengers daily.

How Phosphorus is Made.

THE earthy matter of bones consists of three equivalents of lime united with one equivalent of phosphoric acid. It is what chemists term "a tribasic phosphate of lime." Phosphoric acid consists of one equivalent of phosphorus united with five equivalents of oxygen. In order to obtain the phosphorus, it is only necessary to take away those five equivalents of oxygen, which we can do by mixing the compound with charcoal after some preliminary operations, and heating them together. The charcoal takes away the oxygen and forms carbonic oxide with it, while the phosphorus distils over. In this way we get phosphorus in the condition in which you are very familiar with it. It is a wax-like substance, which must be handled with care, because, if you allow it to dry, the heat of the fingers would be sufficient to inflame it.

Now, observe what this substance looks like. It is semi-transparent; it it soft; you can cut it like wax. It is exceedingly poisonous, and in the making of lucifer matches it is found to be a very insidious poison. Lucifer match-makers are apt at first to be subject to an affection which does not draw much attention. They complain frequently of toothache, but know not the insidious disease which is creeping upon them. The lucifer match-makers who make lucifer matches from this phosphorus are subject to the most distressing of all diseases; the jawbone becomes destroyed, and frequently disappears or becomes useless, and some of them spend the greater parts of their lives in the wards of hospitals. It therefore became an important point for science to find some way by which this phosphorus should be deprived of its poisonous properties without losing those chemical characteristics which make it so useful in making matches for instantaneous light.

Professor SCHROTTER, of Astoria, met this want of science in a very skillful way, as follows: By taking common phosphorus, and exposing it for some time to a temperature of forty-seven degrees, this yellow, waxy, transparent substance transforms into a dark, brick-like substance. It is no longer so inflammable as to ignite spontaneously. It may be packed up in boxes without danger of spontaneous combustion; but what is more important, it has lost all its poisonous properties. The phosphorus, which was poisonous before, is no longer poisonous in this condition, and it is still capable of being used for making lucifer matches.—*Gaslight Jour.*

The Preservation of Stone.

ON this subject, a correspondent of the London *Builder* says: "Try a solution of oxalic acid, so as to obtain a surface of the oxalate of calcium in place of one of friable carbonate. I have not had many opportunities of trying experiments upon the subject, but, as far as I have gone with pieces of Bath-stone, the result is most satisfactory, the surface of the stone showing, under the microscope, a brilliant coat of crystallized oxalate, which is nearly insoluble, as I have soaked it in water for twelve or fourteen hours, and then find it is acted upon by moderately-strong hydrochloric acid. The process seems so cheap and simple, that I should like to see it tried on the interior of some new building, as it would altogether prevent the destruction of the stone by the sulphurous and other acids formed during the combustion of ordinary coal gas. I think it would also at all times allow the carved work to be cleansed with a common dusting-brush, or even to be washed with water."

Traction Engines for Mines.

THE expense for transportation attendant upon mining enterprises in remote, unsettled districts, is one of the greatest burdens attached to this industry. We are much interested to learn that the proprietors of the Vulture mine, in Arizona—the only mine in that territory which is steadily producing bullion and paying dividends—have ordered from England a traction engine, by the use of which they expect to reduce the cost of the present wagon transportation. If this experiment results successfully, it will be an example eagerly followed in many of our western mining districts; and the demand for traction engines will revive, no doubt, the energy with which

some excellent American devices of this class have been pressed upon the attention of capitalists—thus far in vain. We recall in particular some meritorious designs of Mr. J. K. FISHER, which might, we think, be easily adapted for passenger and freight transportation over the frequently excellent natural roads of the great inland basin and the Pacific slope.

American Mining and Metallurgy from a Foreign Standpoint.

Notes of a Tour of Observation, by Professor F. STAPFF, of Sweden, Special Correspondent of THE ENGINEERING AND MINING JOURNAL.

VI.

BESSEMER WORKS.

The Bessemer works now under construction at Johnstown, for a daily product of eight tons, will be one of the best establishments of that kind. The Johnstown Bessemer steel is designed for the fabrication of rails, steel-topped at first, solid steel rails, perhaps, afterwards.

The Pennsylvania steel works, situated at Baldwin, three miles southeast of Harrisburgh, close by the Susquehanna river and the Philadelphia railroad, have been engaged in the fabrication of solid steel rails for about three years. Though the furnaces were under repair when I visited the establishment, and consequently no work was doing, I walked through the different departments, and made the following notes :

The apparatus for the fabrication of steel is arranged on two levels in the same building. The upper level comprises—crusher, etc., for pulverizing canister and other lining materials, two reverberatory furnaces for re-melting spiegeleisen, three cupola furnaces for re-melting the pig-iron to be converted, three revolving kettles for the reception of the molten iron, and a blowing engine for the furnaces, of MACKENZIE'S construction, giving a blast of one and a-half pound pressure. The capacity of the reverberatory furnaces is one thousand pounds spiegeleisen each. They are lined with a sandy fire-clay, resembling very much burnt and crushed canister, fired with pea-coal by help of blast, introduced below the grate into the closed ash-pit. The two reverberatory furnaces have a common chimney; the cupola furnaces have a capacity of five tons each, to be melted in half an hour, with anthracite, six tuyers being used. Before each of the cupola furnaces a kettle is fixed on a horizontal axis, around which it may be turned by help of a windlass-gearing with cog-wheels. Together with the turning kettle a gutter is lifted or lowered, through which the molten iron runs from the kettle to the converter. Two converters are placed on the six-feet lower level of the establishment, before two of the cupola furnaces (and kettles) on the higher level, room for a third converter being reserved before the third cupola. The pear-shaped converters, of English style, have a capacity of five tons. Their lower portion is lined with a mixture of burnt and crushed canister (quartzite) and very-little fire-clay ; the upper portion, which serves as a flue and gutter, with refractory bricks. Eleven tuyers are fitted through the bottom of each converter, covered by a common bottom-plate, which is easily removed. The tuyers of burnt fireclay are about 15 in. high, and 4 in. 5 in. broad; twelve holes, about 0.15 in. and 0.03 in. wide at the upper and lower ends, are bored through each tuyer. These holes form two double rows, standing crosswise. The converters are turned by water-pressure engines, working under a pressure of about three hundred pounds per square inch. Three cranes, used for handling the cast-kettles and the steel ingots, are also moved by hydraulic power, the supply of water for all these machines being furnished by a WORTHINGTON steam pump, and an accumulator of customary construction. The blast engine for the converters (situated in a special engine-house, together with other machinery) is double-acting, with two cylinders. By thirty strokes a minute a blast of thirty-five pounds pressure is produced, having a temperature of 110° F. The blast-cylinders are not cooled by water-currents.

The pig-iron used for the fabrication of Bessemer steel is grey Lake Superior (charcoal) of a coarse foliated crystalline texture, showing plenty of graphite. I am told that, besides the Lake Superior pig-iron, also English had been used, but I did not see it or hear about it at Baldwin. The greater part of the spiegeleisen consumed is imported from Prussia. The common method followed at Baldwin is to convert the pig-iron into (fluid) wrought iron, which then is carbonized to steel of the desired degree of hardness by the addition of a proper quantity of molten spiegeleisen. In the rolling-mill department of the establishment the steel ingots are re-heated, hammered under a six ton steam-hammer, re-heated anew, and rolled to rails.

By eight operations daily, forty-five to fifty tons pig-iron and spiegeleisen are converted into forty tons ingot-steel. But plenty of refuse material and scrap-steel are received besides, and worked up by re-melting in the cupola furnaces, together with common pig-iron charges, or by mixing in the fluid contents of the converters. Also, the ends of rails, bore-shavings and other wastes from the steel manufacture, are said to be used in the same way. In visiting Bessemer works, I have often wondered that crucible-steel furnaces are not *always* connected with them. There is no more direct way of turning Bessemer scrap steel and manufacturing wastes into valuable ingots, than by re-melting in crucibles. Re-melted Bessemer steel is generally considered to be more uniform and of higher average quality than Bessemer steel ingots directly cast from the converters. The duration of the lower part of the converters is about one month, (two hundred operations) that of the caps only one week (fifty operations.)

As fastening holes cannot be punched through the steel rails, they are bored. The curled, thin and long bore-shavings obtained by this operation indicate a considerable uniformity and tenacity of the steel ; and the railroad track between Harrisburgh and Baldwin, composed of Bessemer steel rails from the Pennsylvania steel works, is a permanent and striking testimonial for the quality of their products. The annual capacity is about twenty thousand tons. Judiciously arranged joiner, moulding, foundry, machine and blacksmith shops are connected with the works, for the fabrication and repair of tools and machinery for their own use.

It is an indisputable truth, that pig-iron of inferior quality (particularly if it contains much phosphorus) is not suitable material for the Bessemer process. Such pig-iron, if it must be used for the fabrication of steel, should be treated by other processes ; for instance, the Siemens-Martin process. But it must be conceded, on the other hand, that not all American pig-iron is unfit for the fabrication of *good* Bessemer steel. At one establishment I heard some ridicule of the declaration of a young Swedish metallurgist, visiting this country, that only pig-iron yielding less than 0.02 per cent. of phosphorus would make *good* Bessemer steel, and the subsequent declaration of a Russian engineer, that 0.05 per cent. of phosphorus was the legitimate limit. Indeed, I do not know where the English Bessemer steel makers get pig-iron which satisfies these stipulations. If it is replied, that English Bessemer steel generally is not of the very best quality desirable and accessible, I may be allowed to call to mind the apparatus "for special purposes" in Mr. KRUPP'S cast-steel works, which is generally supposed to be no more or less than Bessemer converters with appurtenances, and to be designed for the fabrication of steel, which, being partially or totally re-melted in crucibles, passes through the world as the famous KRUPP'S cast-steel. But of all sorts of pig-iron, English and Prussian, used in Mr. KRUPP'S establishment. none will be so free from phosphorus as indicated above, the Siegen spiegeleisen excepted. In Silesia, Bessemer steel is made of pig-iron, which certainly is not renowned for its want of phosphorus ; and, as America possesses plenty of ores and coal which equal and surpass the English, Westphalia, Silesian, etc., not only in quantity and easy accessibility, but also in quality, the conclusion seems to be justified that by careful blast-furnace processes, pig-iron could be made by the bulk quite as suitable for good Bessemer steel as that of the countries named. A speedy installation of the Bessemer process at the Missouri charcoal furnaces seems highly advisable. Earlier or later, the fabrication of *charcoal* pig-iron in Missouri must have an end ; but this epoch can be retarded, if the value of the Missouri charcoal pig can be so much increased (by converting it into steel) that it can be made with profit in spite of charcoal prices considerably higher than the present. The current profit from these establishments should be augmented all the more, as the time for their existence in all cases is a limited one. It is here insignificant that the Iron Mountain ores make a red-short iron, as the quality of the pig-iron could be improved by a more careful roasting of the ores, and the sulphur then remaining in the pig-iron will be removed by the Bessemer process. The arrangement in the present case most suitable for the purpose, would be the Swedish, namely, converting the pig-iron directly from the blast-furnaces, without previous casting in moulds and re-melting of pigs. Probably it would be best not to establish steel manufacturing works at the isolated Missouri charcoal furnaces, but to put in the market Missouri Bessemer charcoal-steel ingots. I regret very much that I have not seen the Trenton works (N. J.) where the Siemens-Martin process is successfully practised.

Cast-Steel Works.—At the Lake Superior Copper and Steel Works, Pittsburgh, belonging to PARK & Co., charcoal pig-iron from Champlain and Superior is puddled and rolled to flat bars. These are cemented to blister-steel, in double furnaces of twenty-five tons capacity, a brand lasting six days, and a week being necessary for cooling the furnace and emptying the two chests. The blister-steel is carefully sorted and a part of it directly converted into so-called German steel, which is chiefly used for plough-shares (made in the establishment). Another and greater part of the blister-steel is converted into cast-steel. The cast-steel furnaces contain two crucibles each ; are fired with coke, independently of each other, each furnace having its special chimney. The crucibles from the New Jersey crucible works stand from two to four operations. Their capacity is 80 to 90 pounds molten steel, by which they are two-thirds filled. The cast-steel charges are composed of broken blister-steel, spiegeleisen, manganese, and ferrocyanide of potassium. I do not know the proportions of these ingredients, nor whether they are always used together ; but I think that they must be considerably varied, according to the sort of steel to be produced, the degree of carbonization of the blister-steel, and the chemical composition of the spiegeleisen and manganese employed. Here we have an example where numerous and expensive empirical trials should be replaced by the scientific composition of the charges after analysis of the different ingredients. But this is practically impossible, so long as the common circumstantial and expensive analytical methods for determining carbon, etc., are employed.

Each crucible, being filled to the brim, is covered with a lock, and for about two hours exposed to the increasing heat of the furnace. Then the coke is allowed to burn down, the crucibles are lifted out of the furnace-shafts, a little lump of slag is drawn from the steel, and the contents of two crucibles are cast to an ingot of about 170 pounds. The greater part of the steel is rolled to bars ; those designated for fine tools and chirurgical instruments are not thicker than a thin quill.

The general proceeding is the same in the steel works of Messrs. ANDERSON & WOODS, Pittsburgh ; but two SIEMEN'S regenerator-furnaces have lately replaced here the most of the coke-furnaces. The furnaces are fired with bituminous coal, and the whole apparatus for firing, "heat-regenerating" and melting is situated below the floor of the establishment. The melting furnace, where the gases generated from the bituminous coal are burnt around the crucibles, by air re-heated in the "regenerator-chambers," is a narrow and high channel below the floor, furnished with twelve covered holes. Below each hole two crucibles are placed on the bottom of the channel, easily accessible, by tongs, from above. The capacity of each crucible is eighty-four pounds molten steel, and four charges being made in twelve hours, the average daily product of each furnace-system is 8064 pounds ingot steel. Even here, the charges are made of broken blister-steel, spiegeleisen, manganese, and ferrocyanide of potassium. Swede bars, now and then, being used for blister-steel, it is complained that they are sometimes of inconstant quality. If Swede bars with the same stamps are used, this complaint at first hand hits the commission agents.

Compared with coke-furnaces of the old style, each of the new furnace systems, containing twenty-four crucibles, is stated to effect a daily (!) saving of seventy-eight dollars, from which should be subtracted five dollars patent royalty.

Rolling-mills and Manufacturing Works.—I will not describe the many rail-mills, rolling-mills for bar-iron, sheet, plate, mine rails, etc., nor the iron and steel manufacturing works, which I have passed through during my journey, since descriptions of that kind cannot be interesting, unless very detailed, and accompanied with plenty of exact drawings. Time did not permit me to penetrate this field, where metallurgy and mechanics join hands. But I beg leave to express my opinion that Europeans have much to learn from Americans upon the field of manufacturing-engineering, more perhaps than in any other branch of mineral and metallurgical industry.

The rail-mills at Bethlehem, Johnstown, and Baldwin (Pennsylvania steel-works), are worked by high-cylinder machines, which were first used in this country at Johnstown, by the renowned engineers JOHN and GEORGE FRITZ (the latter now at Bethlehem). As the Johnstown rail-mills (Cambria Ironworks) are the largest in this country, some historical notes about them, from the Johnstown Directory, may be allowed. An old furnace at Johnstown, belonging to Messrs. KING and SCHONBERGHER, was bought in 1852 by a company which began operations in 1853, under the superintendence of G. S. KING, and delivered their first rails to the Portage Railroad, in 1854. Financial difficulties caused a stoppage of the establishment, which in 1855 was ceded to Messrs. WOOD, MORELL & Co. Destroyed by fire in 1857, it was reconstructed and enlarged to its present shape and solidity. In 1862 the Cambria Iron Company was reorganized, under Messrs. WOOD, President; TOWNSEND, Vice-President ; JOHN FRITZ, Superintendent ; and the three furnaces of the BLAIR Iron and Coal Company at Holydaysburg, producing three hundred tons a week, were connected with it. At present, this powerful company possesses four furnaces at Johnstown, three at Holydaysburg, one at Connenaugh ; raises daily about eight hundred tons coal from the Johnstown mines ; occupies 4,000 hands, 2,500 in the establishments, 1,500 in the coal and iron mines ; and produces weekly 1,500, or yearly 75,000 tons of rails.

The capacity of the puddling furnaces is 1,000 tons a week ; and besides, an average of 500 tons of old rails are re-rolled in the same time. The rails produced in this establisnment would in a single track encompass the globe. American iron rails are composed, exactly like the European ones, of tough iron bottoms and hard corn iron tops. The middle crop is often made of a cheaper sort of iron, or of old rails.

Among my memoranda about the manufacture of other iron and steel articles, I find some notes concerning the fabrication of horse-shoes at SCHONBERGHER & Co's establishment, Pittsburgh. These were formerly made from re-puddled scrap-iron; but at present mock bars from Ellershausen puddled iron are the raw material for this fabrication. In the first operation, the bars of suitable sizes are rolled through a pair of carved rollers, by which nail-hole marks and lines, indicating the exact length of the cut-off for each shoe, are impressed on the bars. In the second operation the bars are cut in pieces, each piece to furnish a horse-shoe. In the third operation these pieces are re-heated, and bent by a roller with a projection which catches the pieces, and draws them through two stops close on the sides of the roller. In the fourth operation the shoes are evened by being hammered upon an anvil with a horse-shoe mould. During this process plenty of water is conducted upon the hot shoes. In the fifth operation nail-holes are punched out on the spots marked by the first operation. The heel and toe corks must be made by the blacksmith. Some two hundred and fifty kegs of four or six different sorts of horse-shoes are produced daily.

Nails are the other chief article of SCHONBERGHER & Co's manufactory. The iron used for nails is common puddled, rolled to sheets of the thickness of the nails required. These sheets are cut in strips as broad as the nails shall be long. It should be observed that the direction in which the sheets are rolled must agree with the length of the nails made of the sheets, for procuring coincidence between the directions of greatest strength and greatest resistance. The nails are clipped from the sheet-strips by machines, after the same plan as those used in Europe, and particularly in Sweden. The first operation of the machine is to clip a strip from the sheet of the length and thickness of the nail to be made ; the second, to seize this strip close below the head (that is to be) and to press it to a convenient form ; the third, simultaneous with the second, to form the head by a blow from the side. As nails should be thinner at the point than at the head, the nail-strips are not cut straight from the sheet-strips, but a little obliquely. By turning the sheet-strips after each blow of the machinery, the oblique cuts are made to converge against the nail-points. The feed of the sheet-strips after each turn and after each stroke of the machinery, is regulated by a feathering stopper behind the dipping shear. Thin nails are made of cold sheet, thicker ones of re-heated sheet ; but only a part of the sheet-strips are directly re-heated in furnaces, the rest being warmed by contact with the red-hot strips. Five hundred kegs of different nails were said to be made in a day ; the number of machines used I estimated about one hundred.

TO BE CONCLUDED.

A New Process for the Extraction of Copper from Its Ore.

By DR. T. STERRY HUNT, F.R.S., and JAMES DOUGLAS, JR., ESQ.

II.

EXPLANATIONS.

[We omit a few paragraphs concerning the chemical reactions of precipitation, already sufficiently explained in our editorial columns.—ED.]

Preparation of the Ores.—In the calcination of carbonates, as recommended, the object is to expel the carbonic acid, which would otherwise cause much effervescence in the bath. When the red or dinoxide predominates in the ore, this should be, in part at least, converted into the protoxide by calcination in the air, since when alone it leaves one-third of its copper undissolved in the bath. In oxidizing sulphuretted ores by roasting till all the copper is oxidized there is obtained a mixture of sulphate of copper with protoxide and a portion of dinoxide, which latter, according to PLATTNER, may amount to 20 or 30 per cent. of the copper. Farther roasting at a high heat will convert both this and the sulphate into protoxide, but this condition is less advantageous, inasmuch as both time and fuel are consumed, and the copper is rendered less soluble. The large proportion of dinoxide, moreover, suffices, as already explained, to convert much of the protochloride of copper into dichloride, thereby effecting a saving of iron in precipitating.

Consumption of Metallic Iron.—With few exceptions, the copper extracted by solution from its ores is thrown down in the metallic state as cement copper, by means of metallic iron. In theory, there are required less than 89 (88.3) parts of pure iron to precipitate 100 parts of copper from a solution of protosulphate or protochloride, but in practice, two or three times as much are consumed. This great consumption of metallic iron is due to two principal causes :

1st. In the ordinary process for extracting copper from its ores by the moist way, acids (and sometimes persalts of iron) are employed to render the copper soluble, either as the principal agents or as auxiliaries. When these are employed, the solutions contain more or less of persalts of iron, which consume the metallic iron that would otherwise throw down the copper. Thus an amount of persulphate holding four equivalents of iron consumes five equivalents of metallic iron, and is thereby converted into protosulphate, depositing at the same time four equivalents of iron in the form of an insoluble basic persulphate, which contaminates the cement copper.

2d. The second cause of the waste of iron is the action of the air. In order to separate the whole of the copper from the solutions a digestion of several days with metallic iron is resorted to. The protosalt of iron, which is formed in this reaction, greedily absorbs oxygen from the air, and is thereby converted into a mixture of an insoluble and a soluble persalt. The latter, as above shown, dissolves a quantity of iron in its turn, and yields another portion of insoluble persalt, which falls with the cement copper.

The result of the above causes combined is that instead of 89 parts of iron there are consumed, according to circumstances, from 200 to 300 parts of metallic iron to produce 100 parts of metallic copper in the form of cement copper. This, too, is rendered impure by an admixture of insoluble persalts of iron, generally amounting to from 20 to 40 per cent., and even more. The present process avoids both of these faults, and enables us to obtain a pure cement copper with a very small consumption of iron. The solution obtained with the bath of protochloride of iron can contain no persalt of iron in solution, and if protoxide of copper alone has been employed, will hold three equivalents of copper combined with two equivalents of chlorine, so that they will be precipitated by two equivalents of iron, being at the rate of 59 parts of metallic iron for 100 parts of metallic copper. If, from the presence of much dinoxide, or from other reasons, the greater part of the copper be present as dichloride, it will be remembered that this requires only one equivalent of iron to precipitate two equivalents of copper, being at the rate of 45 parts of iron for 100 parts of metallic copper.

The precipitation of copper from the solutions is at first rapid, especially if these are hot, and kept in agitation. Inasmuch as the waste liquors are not rejected in this, as in the ordinary process, the long digestion with iron required to remove the last portion of copper is dispensed with, and the liquid, after having given up the greater part of its metal, is withdrawn, and used for the treatment of a fresh portion of ore. The prolonged action of the air on the bath is thus avoided, and we obtain a cement copper almost entirely free from insoluble iron salts, and with the consumption of a minimum quantity of iron.

The Regenerated Bath.—If the action of the air be excluded, it will be found that the bath, after complete precipitation of the copper by iron, will be nearly as rich in protochloride of iron as before the solution of the copper. The loss, which is due to the separation of a portion of oxychloride of iron during the solution, is variable, and in some cases does not exceed six per cent. The various ways of supplying this loss are three : (1) The direct addition to the bath of a portion of protosulphate or protochloride of iron. (2) The addition of a portion of sulphate of copper from the roasted ore ; and (3) the use of sulphurous acid. Of these, the first requires no explanation, and the second and third will be explained under the two following headings. The proportion of iron in the bath should be determined from time to time by the following method : A small portion of the bath, freed from copper by digestion for some hours with metallic iron in a stoppered bottle, is diluted with 20 parts of water, and strongly acidulated with sulphuric acid. A standard solution of permaganate of potash of known strength is then added from a graduated tube so long as it is decolorized. By comparative experiments of this kind on the regenerated bath, its strength in protochloride of iron is readily determined.

Protosalts of Iron. In preparing the bath, we have recommended either protosulphate or protochloride of iron. The former salt, being an article of commerce, is to be obtained in many places where the latter cannot readily be procured, and may be easily manufactured for the purpose in regions where neither of these can be readily obtained, provided sulphuretted copper ores are to be had. It is well known that in roasting these a considerable portion of the copper is converted into sulphate, which may be readily dissolved by water from the roasted ore. If to each 63.4 pounds of copper thus dissolved, we add 120 pounds of common salt, and digest the liquid with metallic iron in a close vessel, best with the aid of heat, till the copper is precipitated, the solution will contain such an amount of protochloride of iron that it will only be necessary to add 200 pounds of common salt and a sufficient amount of water, to make 100 gallons of the bath of the strength before prescribed.

If a roasted ore, charged with sulphate, be added directly to the bath of protochloride of iron, it will be found, after precipitating the copper by metallic iron, that the regenerated bath will contain not only the protosalt of iron, corresponding to that originally present in the bath, but also that resulting from the action of the metallic iron on the sulphate of copper introduced, which has given rise to protochloride of iron and sulphate of soda by double decomposition ; thus rendering the bath impure, both from the presence of sulphates and from an excess of protochloride of iron. To obviate these results, we add to such roasted ores (as already described in § 11,) so much lime as may be necessary to convert the whole or the greater part of the sulphate of copper present into insoluble sulphate of lime and protoxide of copper, which latter is at once soluble in the protochloride bath. A small portion of sulphate of copper, as above prescribed, may be left undecomposed by lime, and by its reaction with metallic iron, will give the protosulphate of iron required to supply the small loss already explained, and keep up the regenerated bath to its original standard, as shown by the test with permaganate.

The use of protosulphate of iron for making the bath, introduces a large proportion of sulphate of soda. A large amount of this, it is true, crystallizes out when the bath is exposed to cold, and may thus be got rid of. The use of a portion of chloride of calcium may also, as already explained, be resorted to with advantage where this substance can be cheaply procured. In districts where hydrochloric acid is a bye product of little value, it will be best to obtain the protochloride of iron directly by saturating the crude acid with scrap iron, and employing the product as already explained.

Use of Sulphurous Acid.—When the mixture resulting from the action of oxide of copper upon the bath of protochloride of iron, is heated and exposed to the action of an excess of sulphurous acid, the whole of the separated peroxide of iron is converted into a protosalt, and the bath, after precipitation by metallic iron, is found to contain much more protosalt than at first. Such a result is, of course, to be avoided, but by passing into the bath a small portion of sulphurous acid towards the close of the digestion, it is easy to dissolve such a portion of the precipitated oxychloride or oxide of iron as to prevent the loss of iron, which otherwise occurs, and keep up the standard of the regenerated bath without the addition of a salt of iron or of sulphate of copper.

Solvent Power of Protochloride of Copper.—Protochloride of copper readily attacks metallic copper, forming with it dichloride. Hence, as already explained, the metallic copper which is separated when the protochloride of iron bath acts on dinoxide of copper is at once dissolved if an equivalent of protoxide of copper be present to yield the requisite amount of protochloride. The protochloride of copper will also attack the certain sulphuretted compounds of copper. Copper glance, purple copper ore, or artificial products, such as regulus, approaching these in composition, are readily dissolved by a solution of protochloride of copper mixed with common salt, dichloride of copper being formed. Hence, a sulphuretted ore imperfectly roasted, and still containing a small portion of sulpquret, rich in copper, will give it up to the action of a bath containing protochloride of copper.

The Broadway Tunnel.

The members of the press and invited guests on Saturday, the 26th ult., had the pleasure of inspecting the new "Broadway Tunnel," since thrown open to the public. Until that time little had been known of the tunnel that was slowly being pushed down Broadway from the corner of Warren street. Articles had appeared in the newspapers giving full accounts of the affair, but nobody had entered the carefully guarded doors under DEVLIN'S store to know whether the descriptions were statements of facts. On Saturday the facts spoke for themselves ; and a large number of gentlemen saw the Broadway Tunnel, an actual fact. The reception-room is the full width of the Warren street sidewalk, is lighted from above, and fitted up in perfect taste. From the end of the reception-room the tunnel makes a curve till it reaches Broadway. This part of the bore is lined with iron-plates bolted together ; beyond the curve, brickwork takes the place of the iron. The length of the tube from the station is now just equal to the block between Warren and Murray streets, or a little more than two hundred feet. On the bottom of the tube, some two feet on each side of the centre, are the rails upon which the car runs. The car itself is a cylinder, and nearly fills the tube, the space left being not more than two inches. This is a very small windage, when we take into account the area of the car, and the comparatively small amount of resistance. One quarter of a pound pressure per square inch would give a driving power to the car of about 1,500 pounds. Both car and tunnel were brilliantly illuminated, the former with zircon-light, and the latter with ordinary street gas. The car is propelled into the tunnel by a current of air from an immense rotary fan or blowing-engine, which, in turn, is driven by a hundred horse-power steam-engine. The steam-engine was originally built for driving a propeller, and is of novel construction, occupying a space hardly six feet by three, and not more than seven feet from the bed-plate. It may be briefly described thus : two upright truck-cylinders have their connecting-rods joined to the ends of a horizontal walking-beam. The lower point of this beam receives the crank-pin, and as the pistons rise and fall the beam carries the crank round. Taken all in all, it is hardly possible to find a more compact engine, where at the same time all connecting rods are of good length, avoiding severe diagonal thrust.

A bountiful collation made the visit a most pleasing one to the inner man.

Oliver's Powder.

TO THE EDITOR—Sir : The article under this heading in the JOURNAL of February, contained some slight inaccuracies ; allow me to correct them. OLIVER'S Powder has been manufactured near Wilkesbarre, Pennsylvania, for some months past, not by General OLIVER, but by the Luzerne Powder Company, a corporation organized by our principal coal men and miners, after having satisfied themselves, by using the powder, that it was all that was claimed for it. This company has purchased the exclusive right to manufacture this powder in a large part of the State of Pennsylvania, and the success which has attended its introduction in the mines has been very satisfactory. Orders for it are constantly increasing, notwithstanding the fact that a large number of our mines are not working. The stock of the company is nearly all held by the proprietors of our mines and by the miners, so that the company is on a good foundation and is making money, though the price of powder is exceedingly low—$2.75 to $3.75 per keg of twenty-five pounds. The company has been managed in a careful, business-like manner, and has not resorted to puffing to make itself known ; but since the invention is one calculated to be of great public benefit, by reducing the risk and danger in the manufacture of powder, and by producing, at the same time, a safer and much more powerful explosive than any other now in use in our mines, some particulars may not be uninteresting. General OLIVER'S patents refer to both the ingredients used, and to the machinery employed in the manufacture of the powder. In composition the principal difference between this and other powders is in the substitution of peat for charcoal ; and this, together with the method of manufacture, produces an article which has invariably shown, in the "powder prover," a strength from twenty to thirty per cent. greater than that of DUPONTS', HAZARD'S, SMITH & RAND'S, or any other powder now in use in our mines. This fact has been satisfactorily proved to a great number of persons, and the officers of the company will afford every facility to those wishing to satisfy themselves on this point. The sporting powder manufactured by the Luzerne Powder Company, as compared with the finest brands of rifle powder, has been shown to give a much higher velocity, and consequently greater penetration to the ball. It fouls the gun less, and, like the blasting powder, it produces less smoke than do the powders now in use. The machinery used in the manufacture is very simple and inexpensive, and by its use explosion becomes impossible, only a very small quantity of powder being at any one time in the mill, and that while unconfined, being inexplosive. General OLIVER'S improvements in the manufacture of powder have stood the test of actual practice, and have proved themselves of great value ; and the success attending the manufacture by the Luzerne Powder Company has been sufficient to induce the company to determine on building a second mill near Hazleton, Pennsylvania.

WILKESBARRE, February 23, 1870. R.

The Elevation and Subsidence of Land.

LETTER FROM DR. LOTT.

UNIVERSITY OF CALIFORNIA LIBRARY

TO THE EDITOR: Sir,—I beg leave to state that at the meeting of the New York Liberal Club of Feb. 9th, 1870, the following additional facts were brought forward in regard to the above subject.

Dr. A. DOUAI, of the *Arbeiter Union*, remarked, that the shores of Matagorda Bay, in Texas, according to his own observation, elevated themselves, between 1852 and 1856, about four feet. Simultaneously, the bay became so shallow that the harbors of Lavaca and Indianola remained accessible for lighters only. They had to be abandoned for sea-going vessels, and a new harbor—Powderhorn—had to be selected, which lies sixteen miles below the former ones. The same gentleman communicated also the following facts : The French scientific exploring expedition in 1865 ascertained that the entire northern coast of Yucatan has been upheaved for about four feet within the past few years.

According to Professor AGASSIZ, the coral reefs of Florida have grown four feet within ten years. If they had grown solely by propagation, it would be a most exceptional case ; the greater part of this rise must therefore be accounted for by an elevation of the bottom of the sea. Now, the formation of the lagoons on the shores of the Gulf States, which is of a very recent date, shows the whole coast is in progress of rising. The formation of the embankments of the Mississippi, of which there are some of one hundred miles in length, would thus be satisfactorily explained.

Captain SMITH, the discoverer of Smith Sound, which is between Greenland and Grinnell-land, indicated its width in 1680 as amounting to seventy-five miles. Dr. KANE, in 1855, found it considerably smaller ; and Dr. HAYES, in 1862, stated that it was only from three to four miles wide, and filled with immovable icebergs. The Swedish expedition of naturalists, in 1866, discovered an old wharf on the west coast of Spitzbergen, fifteen feet above the highest spring-tide, and standing at the side of a mountain. It had been built by the Dutch for cap-

turing whales, and was used for that purpose until the end of the last century. This also indicates a process of rising.

Professor ANDRÉ POEY, formerly director of the Observatory in Havana, said that the northern coast of Cuba is rising, while the southern one is sinking. When Cuba was discovered, there were small islands near the south coast, upon which one could arrive by jumping from one stone to another, so shallow was the water. Now they can only be reached with a boat.

A. OTT.

Imports of Metals and Metallic Manufactures.

FROM the monthly report of the Deputy Special Commissioner of the Revenue in charge of the Treasury Bureau of Statistics, we compile the following statement of imports of minerals, metals, and metallic manufactures during the nine months ending September 30, 1869, and for the corresponding period in 1868:

COMMODITIES.	QUANTITIES. 1868.	QUANTITIES. 1869.	VALUES. 1868.	VALUES. 1869.
Gold bullion (free)	....	....	$400,485	$891,753
Silver bullion "	....	....	136,825	103,137
Gold coin "	....	....	11,672,784	6,387,854
Silver coin "	....	....	5,815 755	3,283,574
Guano (from non-American islands, tons	7,941	11,233	114,555	241,455
Gypsum (free) tons	105,993	83,434	101,683	75,178
Chloride of lime (bleaching powder) lbs	24,803,015	....	572 564	563,538
Coal—Bituminous, tons.	318,226	258,303	897,835	828,825
Copper ore, cwt	16,557	23,475	397,656	62,092
Copper, lbs	1,572,118	278,528	96,474	34,370
Manufactures of copper	....	....	149,899	10,902
Chemicals, drugs, and dyes not specified	....	....	5,780,557	4.367,942
Glass and glass wares—Cylinder, crown, or common window, lbs	29,371,846	18,547,649	1,230,766	841,723
Cylinder and crown, polished, square feet	29,247	139,609	11,401	33,998
Fluted, rolled, or rough plate, square feet	181,137	943,534	24,414	54,906
Cast polished plate, not silvered, square feet	941,574	821,351	520,687	381,486
Do. silvered, sq. feet.	1,841,743	1,430,936	490,262	359,977
Manufac's not specified	....	....	819,405	632,042
Gunpowder, lbs	12,909	618	7,107	221
Iron and steel, and manufact's of—Pig iron, lbs.	254,735,244	151,658,835	1,816,879	1,134,130
Castings, lbs	674,432		19,039	23,211
Bar iron, lbs	142,547,089	105,144,977	2,767,582	1,962,725
Boiler iron, lbs	753,211	1,673,023	23,269	56,134
Band, hoop and scroll.	12,004,362	10,712,817	243,151	249,565
Railr'd bars or rails, lbs	512,662,110	426,373,257	7,347,444	4,322,323
Sheet iron, lbs	18,032,052	14,629,668	753,190	475,911
Old and scrap iron, tons	105,299	74,608	2,884,214	1,392,707
Hardware.	....	....	240,051	134,206
Anchors, cables, chains	9,125,332	5,237,358	344,552	194,290
Machinery	....	....	747,301	175,151
Muskets, pistols, rifles, and sporting guns	....	....	271,831	163,286
Steel ingots, bars, sheets, and wire	....	....	2,097 525	1,398,923
Cutlery	....	....	1,281,468	1,151,650
Files	....	....	480,173	486.567
Saws and tools	....	....	75,608	69,666
Manufactures of iron and steel not specified	....	....	4,123,075	3,547,029
Jewelry and other manufactures of gold & silver	....	....	577,917	541,006
Lead and Manufactu's of pigs, bars and old, lbs.	72,098,481	55,141,689	2,926,491	2,314,298
Manufactures of do. lbs	....	....	18,8 9	15,528
Paints—White & red lead and litharge, lbs	7,392,595	6,033,847	425,393	355,371
Whiting & Paris white.	3,225,849	2,386,109	15,006	14,486
All other paints and painter's colors	....	....	534,243	441,502
Precious stones	....	....	1,725,547	900,648
Salt, lbs	595,822,286	406,625,024	986,869	971,406
Saltpetre (nit. of potash)	6,194,777	2,520,367	249,345	79,978
Soda and salts of ..... Bicarbonate, lbs	10,889,832	16,995,534	285,669	462,051
Carbonate, including sal soda and soda ash, lbs.	117,290,838	105,321,432	1,948,110	1,923,945
Caustic soda, lbs	12,443,399	10,183,561	389,324	348,684
Nitrate, acetate, sulphate, phosphate, & all other salts of soda, lbs	19,608,863	15,313,416	438,168	291,226
Sulphur or brimstone, crude or refined, tons.	25,917	11,769	780,906	301,366
Tin and manufact'res of—In bars, blocks, pigs, cwt	57,797	74,891	1,405,424	1,392,972
In plates, cwt.	1,565,420	1,012,958	6,936,811	5,595,238
Manufactures of do	....	....	126,91	24,495
Zinc, spelter, or tutenegue, and manufac's of In blocks or pigs, lbs	10,246,312	5,672,637	471,417	254,167
In sheets, lbs	9,170,641	3,112,496	534,840	157,872

American Institute Miscellany.

THE following are some of the more interesting items reported at the Polytechnic Club of the Institute:

Heat of the Stars.—Mr. HUGGINS has given to the Royal Society of London the results of a series of observations made by him, for the purpose of determining whether a measurable amount of heat is radiated from the fixed stars. A thermo-electric pile was arranged so that its surface was in the focus of a telescope having an object glass of eight-inch aperture. When the telescope was directed to certain stars, the needle of the delicate galvanometer attached to the pile was sure to move after a minute or two, and when the telescope was held until the image passed off, the needle soon returned to its normal position. The mean of ten or twelve observations gave a deviation by Sirius of 2°; Regulus, 3°; Arcturus, after a lapse of fifteen minutes, 3°. That of Pollux was 1½°, while Castor produced no perceptible movement of the needle.

Chloral.—This compound has been subjected to numerous experiments in France, since the first announcement that it possessed anæsthetic properties. It is formed by the action of perfectly dry chlorine gas upon pure alcohol. The hydrogen atoms liberated are not entirely replaced by chlorine atoms, since the chloral contains two atoms of carbon, three of chlorine, and one of oxygen. In short, it undergoes a spontaneous change, but its hydrate is a crystalline solid. It has been successfully administered to persons suffering from nervous irritability, weakness and wakefulness. M. BOUCHUT, who has investigated its properties with peculiar care, says: "As a therapurtical agent, the hydrate of chloral is a sedative of violent pain in gout of the actronious, sufferings occasioned by nephoratic colic and dental caries. In a word, it is the very best of anæsthetics administered through the stomach. Lastly, it is the quickest and most efficacious remedy in intense choria, when it is required to abate speedily a condition of restlessness, which is in itself a peril to the life of the patient."

Setting Boilers.—A mode of setting boilers was noticed, which had found much favor in Sheffield, England, which consists in arranging plates of fire-clay, by which the gases, at four different stages, in passing through the flues, are thoroughly intermixed, and directed in thin streams against the surface of the boiler. It is said that a pound of bituminous coal will evaporate by this means twelve pounds of water.

Hot Air Supply.—A gentleman is making experiments to ascertain whether it is possible to supply the city of Springfield with hot air, by means of iron pipes surrounded by a non-conducting envelope. He proposes to heat the air by means of long clay tubes of four-inch bore, which are to be kept constantly heated.

MINING SUMMARY.

Nevada.

Annexed will be found a condensed tabular statement of statistics regarding the claims on the Comstock lode, together with the aggregate figures concerning the same for the years 1868, 1867 and 1866:

COMPANY.	Bullion Product.	Dividends.	Assessments.
Alpha	.....	.....	$30 000
American	.....	.....	34,800
Belcher	$18,312	.....	109,200
Bullion	.....	.....	67,500
Crown Point	105,718	.....	150.00
Confidence	18,889	.....	31,000
Chollar-Potosi	1,366,185	$294,000	.....
Central	.....	.....	4.500
Consolidated Virginia	.....	.....	52,200
Daney	.....	.....	72.000
Empire Milling and Mining Co	138,046	.....	30,000
Gould & Curry	258,390	.....	.....
Gould Hill Q. M. and M Co	65,207	.....	10,000
Hale & Norcross	1,029,812	96,000	.....
Imperial	273,727	.....	100.000
Justice	.....	.....	30.000
Julia	.....	.....	22.500
Kentuck	828 834	80,000	40,000
Occidental*	210,0 0	20,000	.....
Ophir	.....	..	134,400
Overman	336,485	.....	128 000
Segregated Belcher	4,839	.....	12,800
Savage	1,162,803	280.000	.....
Sierra Nevada	151,360	45,000	.....
Yellow Jacket*	1,560,000	360,000	360,000
In 1869	$7,528,607	$1,175,0 0	$1,419,1 0
In 1868	8,499,769	2,415,500	1,825,700
In 1867	13,626,062	3.991,950	1,296,250
In 1866	11,732,100	1,754,400	1,194,820

*Bullion estimated.

WHITE PINE—THE SMELTING OF ORES.—A new life has been infused, says the San Francisco *Bulletin*, into the business of silver mining, within the last three or four months, by the success which has rewarded the efforts of those who have been engaged the past season in smelting the ores of the Base Metal Range at White Pine. The abundance and richness of those ores attracted the attention of all who visited that region since its first discovery, and the determined efforts of some of them to conquer the difficulties in the way of their economical reduction, have been rewarded with complete success. Frequent mention has been made in these columns, within the last few months, of the shipment of vast quantities of lead bullion, or base bullion, from Elko to San Francisco, from White Pine. Very few of our readers are aware of the extent and importance of this new branch of industry in the silver region, and we, therefore, give the following from the *Bulletin* of recent date:

"SWANSEA SMELTERS.

"The smelting of argentiferous lead ores had been attempted in this mineral region under the supervision or pretended Swansea smelters, or others professing a knowledge of the business, but with indifferent success. The most extensive works of the kind were in the Humboldt mining region, near Oreana, on the Central Pacific Railroad, from which considerable base bullion was turned out for a while, two or three years ago. But the business did not succeed well, and smelting could not be regarded as a success. Hence no encouragement was afforded by the smelting operations in Humboldt to those owning mines containing similar ores in other portions of the State of Nevada. About a year ago smelting began to be successfully carried on at Cerro Gorda, in Inyo county, in this State, and has been continued with great profit up to the present time. But these mines were too far out of the way to attract public attention, and White Pine drew the multitude. Several small and imperfect furnaces, without blasts, were tried in the Base Metal Range of White Pine last year, and a large and costly furnace and building erected in the fall of 1868 at Shermantown, but it has not up to this day been started up because of its acknowledged imperfections. The first successful smelting done there was by the White Pine Smelting Works, Swansea, near Shermantown, built under the supervision of Mr. Mosheimer for a company in this city. This was accomplished late in the summer, and was soon followed by other furnaces of less perfect appointments, put up by unskilful or unskilled miners, but which were sufficiently successful to encourage more costly and extensive, with steam engines to drive the blast, instead of horse or hand power. The still greater success attending later operations in that and many other localities has caused quite a furore in Central and Eastern Nevada in favor of smelting, and now these furnaces are being constructed in various parts of the State.

"THE SIMPLICITY OF THE PRESENT PLAN.

"The reduction of silver ores by smelting in the manner now practised is so simple and economical compared to the process of crushing and amalgamation with the costly machinery and buildings, that its advantages are apparent to all. Smelting works consisting os two or three upright or cupola furnaces of stone, lined with sandstone or other material that will stand the great heat, and of a size sufficient to reduce 20 or 30 tons of ore in 24 hours, together with a small engine to drive the blast, costs in Eastern Nevada from $3,000 to $5,000. The construction of a mill of the same capacity for reducing ore costs in the same locality $40,000 or $50,000. This great difference in the first cost of reduction works renders the mine-owners comparatively independent of capitalists, and enable a few poor men to unite and erect furnaces on their own mines and reduce the ore themselves. When we take into account the fact that there are 100 and probably 1,000 tons of smelting ore to every ton of milling ore in the silver region, we begin to get an idea of the vast field to be occupied by this new branch of industry. That the advantages of smelting as compared to milling are seen and appreciated by the miners of Eastern Nevada is shown by the present excitement there in relation to the District of Eureka.

"EUREKA DISTRICT.

"This is an old locality, prospected several years since, and is situated about forty miles this side of White Pine and a little south of the Austin road. The ores are base and very rich, containing several hundred dollars per ton in silver. It is scarce two months since parties, knowing the value of the ledges there, began to erect smelting works similar to those in the Base Metal Range at White Pine, and they have been for a month past shipping bullion by the ton to Chicago by rail. They did not have to wait for capitalists to come and erect costly mills, requiring months of time to construct them, but erected furnaces an once and at a slight cost, and before the public at a distance is aware of such a place, they are making shipments of bullion. The facility with which these cheap furnaces may be built is causing their construction in other old mining districts, and in some new ones also, in that State, and next season these will be built by the hundred in all the mineral region, for there are scores of mining districts where the ores are principally base, not only in Nevada, but in Utah, Idaho and Arizona. Many of these districts have for years lain unnoticed or abandoned because no practical process for reducing the ore was known.

"BASE METAL ORES.

"Most of the ores classed as base metal ores are those in which the silver is associated with carbonate of lead, or with galena, and are easily smelted. Copper, antimony, iron and zinc are sometimes found in small quantities associated with the lead and silver, but the proportion is seldom great enough to interfere materially with the smelting. A large portion of these ores carry fifty per cent. of lead. Some carry much more, and none of those carrying less are receiving much attention at present, unless very rich in silver. We may assume that, as a general thing, two tons of ore will yield one ton of base bullion; and if the ore contains $100 per ton in silver the bullion should contain twice that amount. The ores of the base metal range, which are being smelted, contain from $40 or $50 up to $200 or $300 per ton—say an average of $75 to $100. Those of Eureka District are of a much higher grade. There being no stamps, pans, settlers, retorts or quicksilver used in smelting, nor any very extensive buildings required, the expense of running smelting works probably does not reach, and certainly does not exceed $10 to the ton of ore under ordinary circumstances.

"HOW ORES ARE SMELTED.

"Charcoal is the fuel used, and is fed into the furnace at the top, with alternate layers of ore, which operation is continued night and day until it becomes necessary to stop to re-line the furnace or make other repairs. The metal is drawn from the bottom and put into moulds to cool, forming pigs of 70 to 100 pounds each. In fact it is conducted very much like the smelting of iron at the foundaries in this city. Some of the smelting furnaces at White Pine are constructed by lining an iron cylinder with fire-brick and setting it upright, like the smoke stack of a steamboat. A steady and powerful blast is kept up by a small engine. Those foreigners professing an acquaintance with the business, under whose direction the trials at smelting have hitherto been conducted, either know nothing about it or too little to enable them to adapt it to the different circumstances under which they had to operate in this country. Perseverence on the part of our people, combined with a determination to conquer, has finally resulted in complete success. Some failed in their attempts because they could not get a material for lining their furnaces that would stand fire. Others did not have the right kind of a furnace or could not get a good draught. Others, still, could not get the silver all out of the ore, since a large proportion would be found in the slag; or they could not find a proper flux for the ore. The successful furnace, however, is the upright or cupola furnace, similar to those used in our iron founderies. By a powerful blast, sufficient heat is obtained to fuse the silver as well as the lead. Plenty of sandstone, or fire clay, or other material that will resist the heat, are found in the vicinity of the mines, and experience has demonstrated that the ores must be properly mixed for smelting so as to contain sufficient silicia to form a flux, or the deficiency will be made up from the silica in the material used for lining, thereby destroying or burning out the latter very soon. The quantity of coal required to the ton of ore varies somewhat, according to circumstances, but may be estimated at six to ten bushels.

"THE COST, ETC.

"Assuming that, under favorable circumstances, the labor of extracting the ore and delivering it at the furnace costs $5 per ton, and that the actual cost of smelting is $10 per ton, we have the resulting product of base bullion costing, under the most favorable circumstances, $30 per ton. We may allow a liberal margin for accidents, etc., and call the average cost $50 per ton. Freight from White Pine to Elko, when the roads were good last fall, was $15 per ton. The railroad charges $22 per ton from Elko to this city, being one-half the rate of merchandise. At these rates the bullion delivered here costs $87 per ton. The lead it contains brings, in this market, four and a half cents per pound, or $90 per ton, and the silver brings $1 per ounce, the quantity of each being ascertained by assay. Thus the lead pays all expenses, and the silver is as clear profit. Mr. Selby, our mayor, has a monopoly of the market at present, being the only large consumer of pig lead on this coast. The lead, when separated from the silver, is worth about six and a half cents per pound, or $130 per ton, and the silver is worth, after separation, $1 20 per ounce, affording him a very liberal profit, after paying the cost of parting the metals. The rapid growth of the smelting interest will doubtless soon create competition, and give the miners a better market for their lead. Those having very rich base bullion, however, like that produced at Eureka, can send it East by rail to a better market, and it is probable that a large proportion of the product of Eastern Nevada will next season find its way to an Eastern market. It would be difficult to estimate very correctly the quantity of lead and silver now being produced daily by smelting, but it is much greater than the public is prepared to believe. No account of the amount sent to this city, or of its value, has been furnished to the public by the few who are concerned in it. The great and increasing importance of this new industry can hardly be over-estimated. Many business men, well informed on the subject, believe that the value of the base bullion produced this year will equal that of the silver bullion produced by all the mills. This would more than double the product of the silver mines for the year 1869, amounting probably to $15,000,000. The completion of the Pacific Railroad, which runs through this immense silver region from east to west, renders the numerous and extensive base metal ledges in its vicinity valuable by furnishing an outlet for the lead to market, thereby greatly favoring the smelting interest. The construction of a railroad from Elko to the head of navigation on the Colorado, traversing in its whole length the richest portion of this great mineral region, is rendered necessary to furnish a similar outlet for the base bullion that will within a year or two be produced in Southern and Southeastern Nevada. The lead product of Nevada will soon probably equal that of any other State in the Union."

QUARTERLY RETURNS OF WHITE PINE COUNTY.

The Inland *Empire*, of February 6, publishes the returns of the proceeds of the mines in White Pine county for the quarter ending December 31, 1869. The table, which was compiled from the books of the County Assessor, specifies the names of sixty mines which produced bullion during the quarter. The total product of ore is 12,967 tons, which yielded the sum of $543,741 69, being an averag e

of $41 93 per ton. The largest lot of ore was produced by the Aurora Consolidated, amounting to 2,672 tons, and yielding an average of $28 50 per ton. The once famous Eberhardt produced only 781 tons, averaging $72 per ton. The richest ore was produced by the Eureka, 1,000 pounds of which yielded at the rate of $2,323 20 per ton; the poorest was from the Cadiz, 55 tons of which yielded an average of $8 per ton.

MINING IN ESMERALDA DISTRICT.

A correspondent writing from Pine Grove, February 1, says: A new lead has been discovered six miles southeast of the town, which is very rich. It is called the Dolores. A lot of 109 tons of rock produced 200 pounds of bullion, two-thirds gold. A town called Rockland has been laid out. The Wheeler mine paid during the month $25,000; $18,000 of which was clear profit. The Wilson is yielding an abundance of paying ore, and the mill is kept in constant operation. At the Salt River mine, six miles east, a water mill has been erected. The yield of the district from the 1st of January to the 18th, was $40,000. Capt. Cheevers is opening a portion of the south extension of the Wheeler, called the Cadmus.

Colorado.

COLORADO MILLS.

The Central City *Register* says: The mining counties of Colorado have been the victims of an almost yearly change of fashion. First we had the stamp mills, which were satisfactory till sulphurets were reached; then pan mills came into vogue, to be discarded before half of the pans purchased had arrived from the States; then a dozen or so processes became the fashion in turn, only to be considered as worthless. Smelting works came in, furnishing a market for the higher grades of ores. Under this arrangement, together with cheaper labor and supplies, hundreds of heretofore idle stamps were put in motion, which, with blanket sluices, some pans, and a market for tailings, have created a healthy mining activity, which only needs time and further reduction upon supplies, and consequently upon labor, to stop the mouth of all croakers. While we recognize a certain value in every improvement, and intend always to give the right hand of fellowship to every process introduced, in which there is a probability of success, we hold to continuing our present modes for general use until demonstration in our own country and upon our own ores proves that a different mode will make more net money. That many of our older mills are inefficient and need rebuilding is past all doubt, but as this process is constantly going on, and as the new mills being erected are almost without exception put up in a good, substantial manner by persons thoroughly versed in the milling of our ores, we hope there will be no further changes in the fashion than such as are suggested by practical experience upon our own ground. We often hear how milling is done in California and Nevada, as if their modes must necessarily produce the same results here. First and last, we have had a host of Pacific coast men here to instruct us, and formerly each coming man was hailed as another Moses to lead us out of the wilderness. The mode of pan-amalgamation, as practiced by Mr. Hitchens, is highly spoken of by gentlemen from Clear Creek county, and we trust that his success will at least partially compensate for the useless expenditures heretofore. Others of our citizens, not practical mill men, have argued for years that we should increase the speed of our stamps to sixty or seventy drops per minute, because they have done so in California. In offering this advice they have assumed two things: first, that our ores and the condition of the gold in them were practically similar to those of California; and secondly, that all of our own ores are alike in their composition and in the condition of the gold in them. Both of these assumptions are untrue. All the evidence goes to show that, as a rule, the ores of Colorado contain more sulphurets than those of California, and that the gold in the former is more finely subdivided than in the latter. Whoever leaves these facts out of the question argues from false premises. From the universal experience of mill men, it may be confidently asserted that no given number of drops per minute can or ought to be adopted for all of our ores. Every experienced mill man knows that with soft decomposed ore, whether surface or otherwise, and where the gold is very fine, and the ore hard or soft, a slow rate of motion is necessary to do the best work. It is equally well understood that a fast motion is necessary for the best work where the ore is hard and the gold is coarse. Experiments, heretofore related in this paper, at the Kip & Buell mill, on Bobtail ore, showed that as the number of drops per minute was increased from thirty to sixty there was a marked improvement in the yield per cord as well as an increase of the amount crushed, while another mill running upon the same ore diminished its yield while running at a slower rate each successive week. On the other hand, the ore from Stalker's claims on the California yields an ounce per cord more under the heavy stamps of the Black Hawk Company's mill, running sixteen drops per minute, than it will under the lighter ones, running thirty-two drops per minute. Running at sixty or seventy per minute it is doubtful if it would pay for crushing. The first experiment proved that Bobtail ore should be run on high motion, and the other example that Stalker's California does better on slow motion. Simply this and nothing more, unless by inference that there is a wide difference in the ore or in the condition of the gold in the ore from two deep mines, and that a corresponding difference is necessary in this mode of treatment. Is anybody who attempts to instruct the community so ignorant as to demand that a mill running on soft surface ore or dirt should run sixty or seventy drops a minute? Every man of any experience knows that such a motion on such ore would convert a battery into a steam churn. He would do better to sluice his dirt at once. We do not wish to be understood as opposing high motion when it can be employed without diminishing the yield, but we are confident that the greatest obstacle to a general increase of speed lies in the fineness of the gold in our ores, and recognizing this, the men who furnish the ore to our custom mills demand a slow rate of motion. It has been attempted of late to make a point against our mills on the ground of leaky batteries. On this point we have the testimony of a machinist, whose business it is to repair and build mills. It is his opinion that not one battery in six leaks at all. But supposing that half of them do, which supposition must satisfy the most greedy grumbler, the loss of gold by this means is ordinarily but a trifle as compared with the whole loss. This is universal experience, as has been proved scores of times, by providing a receptacle for the leakage and afterwards carefully panning it down. Of course there are some exceptions, as has been proved by large "clean ups" around old mills. But the leakiest mill we ever saw was one of six stamps that had saved $60,000 in gold. It required about the amount of a pair of blankets to caulk up around the housing, and yet after its removal an expert in the business was called to know what he would give for the clean up around the battery sill, and after a half day's examination he said that $100 might be got out, but it would cost $150 to get it. So much for the catchword of leaky batteries. They are growing less and less every month, and that by simply doing the work better without adding to the height and expense of the mortars. One going into the Black Hawk mill and seeing the water on the floor next to the batteries might think they leaked, but if he will take the trouble to examine the five mortars that have just been removed to give place to others with lighter stamps he will see that those five have not leaked a drop. A leak between the batteries and the tables is much more common than around the housing, but only in rare instances—none that we know of at this time—amounts to anything worth mentioning. Our opinion is that a thousand times as much gold is lost by irregular feeding as by leakage. Whoever will invent a cheap adjustable self-feeder will be a benefactor. It is a libel on our country to assert that we are "following a fashion blindly." We are simply holding fast to the methods that are the best for us, and adding such improvements as are tried and found valuable. During the past year a large number of new mills have been put up, not by stupid, inexperienced men, but by those who have been taught both by failure and success, and men who know how to squeeze as many net dollars out of a load of rock as their would-be instructors. Many improvements have been adopted, among which are the planing of the mortars wherever a joint is to be made with wood, the introduction of adjustable guides, and the adoption of the double faced collar. New methods of concentrating tailings have been adopted, and, if found successful, will be generally used. We see no disposition among our mill men to be self-opinionated or old fogyish. Experience has taught them to hasten very slowly in taking the advice of those whose experience, if they have ever had any, has been in another field, and they are right. It is not a radical change in our modes or machinery that is wanting for our increased and permanent prosperity, so much as the careful and economical use of what we already have and a more general adoption of improvements that have been tried here. Improvement is what we want, and not reconstruction.

BULLION PRODUCT IN 1869.

Governor McCook, in his recent message to the Territorial Legislature, says: "The product of our mines, as shown by statistics, gives a gratifying exhibit of the progress of this branch of our industry. The amount of bullion produced during 1869 is more than double the product of 1868; and although only about one-fifth the product of the mines passes through the mint, the deposits in the Branch Mint at Denver show an amount of $1,193,432 03 for 1869, against $555,696 66 for 1868."

THE TERRIBLE MINE.

The following account of this mine by the Colorado *Miner* will be read with a great deal of interest by mine owners in the vicinity of Georgetown. The record is that of a good mine worked in a business-like way: "The strike of the mine is north 61° 31' east, and the dip of the vein, from the surface to a depth of one hundred feet, is perpendicular; from that point the dip changes to an angle of 12°. The crevice varies in width from four to seven feet, and the walls are smooth and solid. The fissure is filled with the ores of the mine and a gangue of quartz and feldspar, with a small admixture of white shining mica. This gangue, although composed of the same minerals that constitute granite, differs very materially from the dark granite which forms the walls or 'country rock' of the mine. The latter consists of white flinty quartz, feldspar slightly tinged with red, and a dark-colored mica. The 'country rock' of the mine is excessively hard, while the gangue is comparatively soft. 'Slickonsides,' as smooth in many cases as polished mirrors, are found in all parts of the mine. The solid ore streak varies from two to twenty-four inches in thickness, averaging about ten inches. In but three instances, and those due to a small 'horse' in the mine, was the ore vein lost sight of; and on driving through the barren spots, the same rich, massive ore was found. The ores of the mine are zinc blende, galena (both coarse and fine grained), Fahlerz, stephanite (brittle silver), ruby silver, gray copper, and silver glance, and a slight admixture of iron and copper pyrites. Zinc blende and galena are, however, the predominating ores of the mine, the ore yielding from twenty five to fifty per cent. of lead. The Fahlerz is found in considerable quantities, the brittle silver, ruby silver, gray copper and silver glance be ing mingled through the ore in fine particles. Massive specimens of brittle silver have been found in the mine. The ore near the surface carried from $150 to $275 in silver per ton (2,000 pounds), increasing in richness as depth was gained, until, at the depth of seventy-five feet, the average yield per ton of the ore was $500; that from the lowest workings yielding about the same. Nearly all of the first-class ore has been shipped to Newark, N. J., or to Swansea, Wales (England), for treatment; the owners claiming that they can make the ore pay better by shipping than by having it treated in Colorado. The second-class ore, yielding from $150 to $250 per ton, is treated by Stewart & Co., and L. Huepedon & Co., of Georgetown, by a chlorodizing roasting and a subsequent amalgamation. By this process eighty per cent. of the silver is obtained at a cost of treatment of $55 to $60, currency, per ton. The third-class ore, assaying from $60 to $150 per ton, probably averaging about $100, is being piled up on the ground at the foot of Brown mountain, for future treatment. From fifteen hundred to two thousand tons have accumulated during the two years and a half the lode has been worked. Work was begun on the Terrible in the spring of 1867. During the first year the shaft was sunk fifty feet and a short drift run. The mine has now a shaft one hundred and eighty-five feet deep, and six drifts, one each way from the shaft, at depths respectively of fifty-one hundred and twenty, and one hundred and eighty feet, aggregating in length five hundred and seventy-eight feet. A winze has been sunk, one hundred feet east of the shaft, from the first to the second levels, and one hundred feet west of the main shaft an air, shaft has been sunk to the first level. About one hundred and eighty fathoms of stoping has been done above the second level, making the total amount of ground excavated about three hundred and twenty-five fathoms. There has been extracted two hundred tons of first-class ore, which yielded nearly $100,000, coin; two hundred tons of second-class ore, which has yielded over $40,000; and from fifteen hundred to two thousand tons of third-class ore, estimated to carry at least $80 per ton, or $120,000 in all—a total of $260,000, or $800 per fathom. The Terrible shows no evidence of giving any less yield in its future workings, all parts of the mine showing the same strong, well-defined vein."

Wyoming.

QUARTZ MINING IN WYOMING.

The South Pass correspondence of the Omaha *Herald* reads as follows: "Our country, like all other quartz and mining countries, has had its drawbacks—its quartz vampyres and sharks, its retailers of mines which have no existence but on paper. Large amounts have been sold in Chicago and other places, but this has not retarded the progress of the camp in the least. It is to-day ahead of any quartz-mining camp on the North American continent of its age. Our quartz mills have been another great drawback. Many of them were bought by inexperienced men; the mills, being old and useless, were sold by machinists to get them out of the way, frequently failing to save a color of gold, when the same rock, crushed in an arastra, would yield forty dollars per ton; and men at the same time were extracting sufficient gold from the rock, by hand mortars, to sustain themselves and push forward their work. The most of the rich ledges here are owned by poor men, who are co-operating together, driving tunnels and sinking shafts, preparing for a rich, golden harvest in the Spring, if poor Lo will only let us alone, as that is the only drawback now that can ever retard us, as miners, one whit. There is considerable feeling in this camp against certain men who have gone East and sold ledges that had no value, only on paper, and never came back here. We would, of course, like to have men of capital come into our midst and invest their money and make large fortunes, as they are sure to do if they invest in gold ledges. There is no place on this continent where money invested properly will pay better than in milling the Sweetwater quartz. Our quartz is as rich as any on the continent, and contains no base metals, as does Colorado. Most of the quartz in that country has to be sent to Swansea, in Wales, to extract the base metals. A great deal of gold will be taken out next Summer with arastras, as they save more gold than a mill, and most any person can have one. On Rock Creek last summer one arastra, run by one man, took out $17,000 worth of gold—a good summer's work—which will be done in many instances next summer. What people want here is this: If people wish to invest in quartz, they should come to this place, go among the miners, down into the shafts, and pick up the gold themselves. Let their own eyes be their own judges, and not trust to a lot of gold speculators who care for nothing but their pockets."

MINING AND MILLING ITEMS.

The following account was dispatched from South Pass, February 11: "Mining interests are looking up. A great many miners are at work on the hills, sinking shafts and running tunnels up to valuable ledges. Messrs. Grace & Garven are at work on extension ledges, called Buckeye Boy and Eastern Slope. They have a tunnel in thirty feet, and a shaft down twenty-five feet on the former, and a shaft forty-two feet down on the latter. Miners' Delight mill, in full blast, cleaned up $35,000 in a nine days' run. Cariso mill is in operation on the richest rock ever produced here. It is expected to clean up $100 per ton. They have a shaft down one hundred feet, and have struck the ledge wider than ever. It is about six feet between the walls. The Buckeye Company have a mine in full blast, of ten stamps, which is paying well. They have gone through a cap of solid rock forty-three feet, and struck a splendid ledge of good width. The Atlantic mill, twenty stamps, has shut down until Spring. The Mammoth mill is idle, but they have about three thousand tons of ore out, and expect to start up soon."

Arizona.

REVIEW OF THE MINING FIELD.

The Prescott *Miner*, February 5, says: But for the regular weekly bulletin of good news received from the Big Bug mill, now running in Big Bug district, on ore from an extension claim on the Eugenie lode, we would have little to say in favor of mining in this locality, for, at present, it (Big Bug mill) is the only institution of the kind in these parts that grinds out any gold. The Eureka mill at Walker's is idle. So, too, are the Chase and Sterling mills, in Hassayampa district. What is being done with the arastras at Walnut Grove, on the lower Hassayampa, is to us a mystery, not having heard from that locality in a long time. Of course the Vulture Company's 40-stamp mill, at Vulture City, near Wickenburg, is at work, and we believe paying well. But then it is a long way from this vicinity, and its operation and yield do not encourage us of the mountains very much. Outside of Big Bug district, then, the gold extracted so far this winter, has not amounted to much, and but for the strength and courage imparted to us by the knowledge that Big Bug is all right, we should feel inclined to talk and think less of mining matters. The latest news from the district was brought here a few days ago, by Messrs. L. C. Gray and C. E. Hitchcock. It is sunshiny, and may be relied upon as correct: The mill had run six days and eleven hours, when it was stopped and a clean-up made, the result of which pleased everybody. We have seen that result—a bar, brick, or slug of gold—worth about $1,200. The mill is now running again, and the Superintendent, Mr. McCarthy, thinks he will do even better with this run. The mine was looking first rate; from ten to twelve tons of pay ore was being taken out every day, and there were, when Messrs. Gray and Hitchcock left, about 125 tons of ore at the mill. This is quite encouraging, not only to the company and the superintendent but to every white inhabitant of the Territory, for the only hope we now have of peace and prosperity lies in the successful working of our mines.

Montana.

MINING AT UNIONVILLE.

The Helena *Gazette* furnishes the following notes on the mines at Unionville: "The lower level in the Parkinson mine is two hundred and fifty feet, and the vein of quartz is fourteen feet thick, and of the richest quality ever taken out in that vicinity. About thirty men are at work, and several runs have been made with the most flattering results. The ore which is now being taken out will be crushed at the Whitlatch mill. Mr. P. Powers, the foreman of the Columbia mine, estimates that the whim-house and machinery for hoisting ore and pumping water will cost, when finished, some $40,000. The thirty-stamp mill of the Columbia Company is undergoing a thorough overhauling, and everything will be in readiness to start up shortly. Over a thousand tons of ore is lying in the shafts of this claim, in the vicinity of the hoisting apparatus, ready to bring to the surface. Mr. Ricker, of the I X L mine, besides keeping his mill running without cessation, estimates that he has about a thousand tons of ore ahead. The quartz from this mine turns out at the I X L mill from $4,500 to $5,500 to the run of ten days. Some seventy men are employed in the mine."

British Columbia.

The news by mail to the 25th is in substance as follows:

"KOOTENAI.—The winter had fairly set in, and active mining operations were for the most part suspended. Delaney has struck excellent ground on Perry Creek, while drifting in the bank prospecting as high as $2 to the pan.

"BIG BEND.—Nineteen men are wintering on French Creek. Two companies are at work, getting good pay. There were two feet of snow on French Creek. The frost had been light up to the 19th December, when Gold Creek and Columbia River were frozen over. Mr. Reid crossed Seymour mountain on snow-shoes, and found about ten feet of snow on the summit. He saw no snow below Duck ranch, fifteen miles above Lemloops. There was no ice either in the rivers or lakes. The stock were doing finely.

"DISCOVERY OF A CINNABAR MINE.—Specimens of cinnabar, which assay 55 per cent. at the Government office, have been brought to town from a locality 25 miles distant from Victoria. A prospecting party will leave on Monday for the spot."

MARKET REVIEW.

The Coal Trade.

NEW YORK, March 5th, 1870.

ANTHRACITE.

We note the market much stronger this week and prices slightly advanced, perhaps on an average 25 cents per ton. Quotations, however, are nominal and very little offering. There is a general reluctance to making prices, owing to the suspension; most dealers preferring to hold on to their stocks until the result of the meeting of the Miners' Council is known, when some definite conclusion can be reached. Stove coal is scarce, very little in the market, and the demand brisk; affected no doubt by a strong retail trade. The amount of coal on hand is very small, very little having been sent to market the past week.

It is asserted that a meeting of the Council is to take place on Monday, March 7th, when a decision upon the question of a continuance of the suspension will be finally determined upon. The action of the men working for three large companies in the Lackawanna region, in disregarding the order of the Council determined upon at the meeting held at Hyde Park, February 22nd, to suspend in all the mining regions during March, has complicated matters extremely, and at present writing it is difficult to determine whether the men working for these companies will join in the suspension next week, or whether a general resumption will ensue. Should they positively decline to join, we expect a general resumption of work in those regions now idle will take place.

The suspension in the Lehigh and Schuylkill regions is complete, as well as in that portion of the Wilkesbarre region where the men work upon the "basis" system. The men working for the Delaware and Hudson, Scranton and Pennsylvania coal companies, who are paid now the same rate of wages as agreed upon last Fall, when coal was $8 per ton, thus far decline to join the movement for a suspension. In our judgment the time selected for the suspension is unwise, as there would have been an active demand for coal during the month; hence it was utterly unnecessary.

RETAIL.

The retail trade has been brisk, stimulated by the sharp weather of the past week. Though we do not quote an advance in prices, $6 50 being about the average—still the supply of stove coal in the market is small.

ITEMS.

The following items we clip from the Mauch Chunk *Times*:

From the Wyoming region we learn that the men at nearly all the collieries went out on Monday. The general impression is that the majority of them will go to work by the close of the present week. We are reliably informed that the Plymouth men went to work again yesterday.

All the collieries on the Beaver Meadow side stopped work on Tuesday. Carter & Co.'s men had quite a stormy meeting on Monday night, and after a protracted session resolved to quit until they could ascertain what others were going to do. We are in hopes that the miners this region will reconsider their action, and resume work by Monday next.

The men employed in A. Pardee & Co.'s mines, on the Hazleton side, held a meeting on Monday night, and after some discussion a motion was made to suspend, which was lost, the vote standing—90 for suspension, 128 against.

Our information from the Schuylkill region is that there is a sharp contest being waged between the suspensionists and anti-suspensionists. All the collieries, with but few exceptions, are idle.

Work is going on at all the collieries in this basin, with the exception of Stockton, Ebervale and Milrusville. The men assert that if the Hyde Park men continue to work they will not go out.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending February 26, 1870, compared with week ending February 27, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R	39,312	466,950	40,116	508,387
†Schuylkill Canal				
Lehigh Valley R. R.	29 800	488,601	53.439	643,634
Lehigh and Sus. R. R.	15,387	145,121	11,007	127,679
†Lehigh Canal				
Scranton North	11,642	78,707	11,951	93,783
" South	30 007	240,057	31,819	244,021
Penn. Coal Co., rail	13,075	123,635	14,640	138,166
† " " canal				
Del. and Hudson, rail, N.			7,418	93,559
" " " south			2,442	20,0.7
Delaware & Hud. Can. N				
" " S.				
Shamokin	4,432	53.988	6.252	44,331
Trevorton	347	2.872	298	3,220
Short Mountain	902	4,715		
Lykens Valley Coal Co.	1,188	5,270		
†Wyoming South				
† " North				
P. N. Y. C. & R. R. Co.			5.141	51,701
Williamstown, Col'y	1,174	11.873	5,159	28.407
Total	147,186	1,622,710	189,713	2 009,067
1870			147,186	1 622 710
Increase week and year			42,527	387,257

* Less coal transported for Company's use and Bituminous coal.

† Closed for the Season.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Feb. 26, 1870, compared with week ending Feb. 27, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.				
C. & O. Canal				
H. & B. T. R. R.	6,440	46,619	4.706	29,120
Harrisburg & D.			8,703	77,461
L. V. R. R.		552	751	3,310
P. & N.Y. C. & R. Co.			1,323	3,878
	6,440	47,171	15,483	113,769

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending Feb. 26, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	40.116 02
Previously this year	468,271 12
Total	508,387 14
Same time last year	466 950 00
Decrease	41,437 14
Amount sent same week 1869	39,312 00

Report of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, February 24, 1870:

From St. Clair	21,039 06
" Port Carbon	4,322 09
" Pottsville	20 00
" Schuylkill Haven	8,718 03
" Auburn	1,05 00
" Port Clinton	4,832 06
" Allentown and Alburtis	67 18
" Harrisburgh and Dauphin	8,703 08
Total paying freight	48,919 10
Coal for Company's use	1,988 16
Total for week	50,808 06
To same time last year	564,655 09
Total	615,463 15
To same time last year	523,630 05

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Feb. 26, 1870:

	Tons.
For week	8,703 08
Previously this year	68,758 09
Total	77,461 17

Report of Coal Transported over Lehigh and Susquehanna Railroad.

Week ending February 26, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR, 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	9862 17	8905 08	100942 17	80940 01
Upper Lehigh Region	805 14	2880 08	5716 17	26439 01
Hazleton Region	257 10	52 17	1072 06	1130 19
Mauch Chunk Region	21 04	3908 16	2946 17	36611 08
Totals	11007 05	15837 09	137678 17	145121 09
Increase				
Decrease	4830 04		7442 12	
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	9810 07	13634 14	130879 11	130984 15
Delivered at and above Mauch Chunk	702 18	562 03	4987 08	5465 06
Delivered to L. & B. R. R. at Plymouth Bridge	494 00	264 12	1811 18	4022 14
L. V. R. R. at Sugar N.		1376 00		4648 14
Totals	11007 05	15837 09	137678 12	145121 01
Of the above there was from Company's Mines.	1021 06	3398 15	36819 07	36611 08
Increase			7 19	
Decrease	2977 10			

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, February 26, 1870.

	WEEK.	SEASON.
North	43,145 01	324,196 06
South	2,441 15	20,016 12
Total	45,586 16	344,982 18
Corresponding time in 1869.		
North	23.722 18	283.5?4 02
South	1,944 06	11,063 00
Total	25,667 04	294,647 02
Increase North	19,422 03	Increase 41,382 04
Increase South	497 09	Increase 8,953 12
Total Increase	19,919 12	Increase 50,335 16

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending February 26, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5,144 02	46.557 03	51,701 05
Bituminous	1.323 00	37,457 00	38,780 00
Total, Ant. and Bit.	6,467 02	84,014 03	90,481 05

Report of Coal Transported over Lehigh Valley Railroad

For the week ending February 26, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVL'Y. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	11,722 17	121,988 05	133,711 02
" Hazleton	28,948 03	301,229 01	330,177 04
" Upper Lehigh	105 08	365 02	470 10
" Beaver Meadow	9,290 08	103,217 06	112,507 14
" Mahanoy	5,472 01	63,027 18	68,499 19
" Mauch Chunk		427 18	427 18
Total Anthracite	13,438 17	590,255 10	643,694 07
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.	751 00	2,559 00	3,310 00
P. & N. Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	54,189 17	592,814 10	647.004 07
Same time last year	29,800 05	458,201 01	488,601 06
Increase	24 389 12	134,013 09	158,403 01
Decrease			
Forwarded East from M'h Chunk by rail	46,136 04	526,565 04	472,701 08
Same time last year	28,943 00	431,345 15	460,288 15
Increase	17,193 04	95,219 09	112,412 13

RECAPITULATION.

Forwarded East from M'h Chunk by rail	46,136 04	526,565 04	572,701 08
To N. C. R. R., at Mount Carmel		115 00	115 00
Forwarded North from L. & B. Junction	5,133 01	46,192 16	51,325 17
To L. & S. R. R. at Packerton for rail	388 05	1,329 14	1,717 19
Delivered at M'h Chunk	6 00	270 14	276 14
Delivered on line of road above Mauch Chunk	245 15	2,675 04	2,920 19
Delivered above M. Chunk for use of L. V. R.R.	1,529 12	12,451 09	13,981 01
To L. & S. R. R., at P'n Har., for railroad			
Do. for canal			
At M. Chunk for canal		655 09	655 09
Total Anthracite	53,438 17	590.255 10	643,694 07
Bituminous Coal	751 00	2,559 00	3 310 00
Total all kinds	54.189 17	592.814 10	647,004 07

Cumberland Coal Trade.

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, Feb. 10, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL Tons.	C. & O. CANAL Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870			9,364 15		9,364 15	
1869			12,206 05		12,206 05	
Increase						
Decrease			2,811 10		2,811 10	

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870		68,606 12	68,606 12
1869		88,968 07	88,968 07
Increase		20,361 15	20,361 15
Decrease			

Prices of Coal by the Cargo,

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, March 3. R. A.	W. A.	AT PHILADELPHIA, March 2. R. A.	W. A.
Lump	$— —	$— —	— —	— —
Steamer	— —	— —	— —	
Broken	— —	— —	— —	3 75 to 4 25
Egg	— to —	— —	— —	4 00 to 4 25
Stove	— to —	— —	— —	4 50 to 5 00
Chestnut	— to —	— —	— —	4 00 to —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump	5 75	— —	— —	— —
Broken	5 50	— —	— —	— —
Egg	5 50	— —	— —	— —
Stove	5 75	— —	— —	— —
Chestnut	5 00	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A. 6 50		— —	— —
New England	" — —		— —	— —
Locust Dale	W. A. 6 00		— —	— —
Honey Brook, Le'h	W. A. 4 50 to 5 25		— —	— —
Spring Mountain	" 4 50 to 5 25		— —	— —
Sugar Creek	" 4 50 to 5 25		— —	— —
Sugar Loaf	" 4 50 to 5 25		— —	— —
Old Comp'y's	" 4 50 to 5 25		— —	— —
Cross Creek	" 4 50 to 5 25		— —	— —
Enterprise	" — —		— —	— —
Girardville	" — —		— —	— —
McMichael	" — —		— —	— —
Shamokin	" 5 50		4,75	— —
Lykens Valley	" — —		— —	— —
Broad Top	" — —		4 00	— —
Hill & Harris	" — —		4 50	— —
Henry Clay	" — —		4 50	— —
Powelton	" — —		4 50	— —

Prices for Coal at Mauch Chunk.

	F. L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 25	$3 25	$3 25	$3 75	$3 00
Wilkesbarre	3 00	3 25	3 25	3 25	3 75	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f.o.b. at Phila.	$5 25
Lemon " "	5 00
Cumberland Vein Coal	5 00
Cumberland C. & I. Co.'s on board	7 50
Central C. & M. Co.'s N. Y.	7 50
Consolidated Coal Co.'s "	7 50

[*Dealers in these coals may be found in our advertising columns.]

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	— —	— —	— —	— —	— —	— —
Pittston at N. Y.	— —	— —	— —	— —	— —	— —
Lackawana at Weh'kn.	— —	— —	— —	— —	— —	— —
Wilk'b're at Hoboken	4 75	4 75	4 75	4 75	5 25	4 50
Old Co. Lehigh at Pt. Johnston	5 50	5 00	5 00	5 00	5 25	4 50
Lehigh at E. Port	5 25	5 00	5 00	5 00	5 25	4 50

For freights to different points, see "Freights."

Prices of Foreign Coals.

March, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 9 50@— —
" " Cannel	10 00@12 00
" House "	13 50@15 50
" " Orrel	14 00@16 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs., delivered.

Prices of Gas Coals.

March, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 43 Pine st., N. Y.

Duty, $1 25.

	Coarse. Gold.	Slack. Gold.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75
Lingan	1 75	@— 75
Sydney	2 13½	@— 71½
Pictou	2 13¾	@1 18¾
Little Glace Bay	1 50	@1 00
Caledonia	1 50	@— 75

AMERICAN.

	Coarse. Currency.	Slack. Gold.
Westmoreland Co.	—	@— —
Despard Coal Co.	$8 50	@8 00
Penn.	— —	@— —
Newburg Orrel Gas	8 50	@8 00
West Fairmount Gas Coal	— —	@8 00

AT PHILADELPHIA.

Powelton	$7 80

Prices at Baltimore—March, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$6 00@6 75
Pittston and Plymouth	6 00@6 50
Shamokin Red or White Ash	6 00@6 25
Lykens Valley Red Ash	— —@6 50
Yerba Valley	6 00@6 25
Trevorton, Red Ash	6 00@6 50
By retail, all kinds per ton of 2240 lbs.	7 25@8 50
Georges Creek & Cumberland f. o. b. at Locust Point for shipping	— —@5 00
West Fairmount Gas f. o. b.	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

March, 1870.

George's Creek and Cumberland f. o. b. for shipping	$4 75

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Yebra Valley	— —@— —

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven	$2 00

From Port Carbon, 8 cents per ton more.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 19
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 35

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
R. & D. R. R.	1 28
Cam. & Am. R. R.	
Shipping Expenses	25
Total	$2 34

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 19
Shipping expenses	25
Wharfage	10
Total	$2 49

Foreign and Provincial Freights.

March, 1870.

Foreign.

Newcastle and Ports on Tyne	£15@£17 keel
Liverpool	15s. —. do

TO NEW YORK.

Provincial

Sidney	$3 25
Lingan	3 25
Cow Bay	3 25
Port Caledonia	3 25
Little Glace Bay	3 25

TO BOSTON.

Sydney	$2 75
Lingan	3 75
Cow Bay	3 25
Port Caledonia	3 00
Little Glace Bay	2 25

Freights.—March, 1870.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnston	From Newburg	From Rondout
Stamford	$2 00	$1 10	$	$
Norwalk	2 25	1 00		
Bridgeport	2 00	1 00		
New Haven	2 25	1 00		
Hartford	2 75	1 50		
New London	2 00	1 25		
Norwich and Sou.	2 00	1 40		
Mystic	2 00	1 40		
Stonington	2 00	1 40		
Sag Harbor	2 00	1 40		
Bristol	2 00	1 40		
Newport	2 00	1 40		
Fall River	2 00	1 40		
Providence	2 00	1 40		
Dighton	— —	— —		
Warren	— —	— —		
Pawtucket	2 25	— —		
New Bedford	2 25	1 40		
East Cambridge	3 00	2 00		
Salem	3 00	2 00		
Newburyport	3 10	2 00		
Portsmouth, N. H.	3 35	2 15		
Rockport	— —	— —		
Saco	3 00	2 25		
Portland	2 50	2 00		
Bangor	3 00	— —		
Bath	3 00	2 00		
Middletown	— —	1 40		
Amesbury	3 25	— —		
Boston	2 75	2 00		
Cambridgeport	3 00	2 00		
Taunton	3 10	2 00		
Derby	2 00	— —		
New York	1 75	50		
Hackensack	1 95	— —		
Jersey City	1 75	50		
TO RIVER PORTS.				
Troy	— —	— —		
Albany	— —	— —		
Coeyman's	— —	— —		
Stuyvesant	— —	— —		
Cocksackie	— —	— —		
Hudson	— —	— —		
Catskill	— —	— —		
Poughkeepsie	— —	— —		
Fishkill	— —	— —		
Cold Spring	— —	— —		
Haverstraw	— —	50		
Nyack	1 60	50		
Sing Sing	1 60	— —		
Yonkers	— —	40		
New York	— —	— —		
Saugerties	— —	— —		
Rhinebeck	— —	— —		
Rondout	— —	— —		
Tarrytown	1 60	80		
West Point	— —	— —		

METALS.

NEW YORK, March 4, 1867.

IRON.—Duty: Bars, 1 to 1½ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

Pig, Scotch No. 1, ₱ ton	33 00@37 00
Pig, American, No. 1	34 00@35 —
Pig, American, No. 2	31 —@34 —
Pig, American, Forge	30 —@31 —
Bar, Refined, English and American	— —@82 50
Bar, Swedes, assorted sizes (gold)	85 00@97 50
	Store Prices.
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	120 —@130 —
Bar, Refined	82 50@ 85 —
Bar, Common " "	— —@ 80 —
Scroll	110 —@145 —
Ovals and half-round	105 —@115 —
Band	105 —@ — —
Horse Shoe	105 —@ — —
Rods, ¼ to 3-16 inch	87 50@130 —
Hoop	110 —@150 —
Nail rod, less 5 ₱ ct.	— 8—@— 8½
Sheet, Russia, as to Nos. (gold)	— 11—@12—
Sheet, Single, D, and T. Common	— 4½@— 6½
Sheet, Galvanized	List 25@30 ₱ cent. discount.
Rails, English (gold), ₱ ton	57 00 @— —
Rails, American, at Works in Pa.	76 00 @77 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality)	₱ lb	— 16 @— 20
English Spring (2d and 1st quality)		— 7 @— 13
English Blister (2d and 1st quality)		— 11 @— 18
English Machinery		— 11½@— 14
English German (2d and 1st quality)		— 13 @— 15
American Blister "Black Diamond"		— — @— 12
American, Cast, Tool	do.	— 14 @— 18
American, Spring,	do.	— 9 @— 12
American Machinery,	do.	— — @— 12
American German,	do.	— 10 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 32
Copper Bolts	— @— 33
Copper Braziers, 16oz. and over	— @— 33
Copper Nails	38 @— —
Copper, Old Sheathing, &c., clean	18 @— 19
Copper, Chili Pig	— @— —
Copper, American Ingot	20½@— 20¾
Yellow Metal, New Sheating	— @— 25
Yellow Metal Bolts	— @— 26
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2½ cents ₱ lb.

Galena, ₱ 100 lbs.	$— — @— —
Spanish (gold)	6 20 @6 25
German, do.	6 20 @6 37½
English, do.	6 20 @6 62½
Bar (net)	— — @ 8 00
Pipe and Sheet (net)	— — @ 8 00

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	— @33½
Straits	32½@— 3
English	30½@30½

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ₱ box	$8 25 @8 50	$10 00 @10 50
I. C. Coke	7 00 @7 50	8 50 @9 25
Coke Terne	5 75 @6 00	7 00 @7 50
Charcoal Terne	7 37½@8 00	9 00 @9 75

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb.

	Gold.
Plates, Foreign, ₱ 100 lbs.	$6 00 @6 12½
Plates, Domestic, ₱ lb.	10 @— 12

REMARKS.

IRON.—The demand for Scotch Pig continues light, but as there is very little coming forward, prices are steady at the advance noted in our list above. There is an improved demand for American, induced by the lower rates current, and we notice sales of 2,000 tons No. 2 ex. here and at Philadelphia, for forward delivery, at $32; and 1,500 do. Gray Forge at $31. Wrought Scrap is in moderate demand at steady prices; 200 tons No. 1 and 100 do. Light sold on private terms. There has been an active inquiry for both New and Old Rails since our last, and prices have a hardening tendency; the sales are 4,400 tons New English, and 2,000 do. American on private terms; 300 do. Old Double-Headed, $44; and 1,000 do., $36 75, now held at $37 50 gold. Bar from store continues in the same dormant state, while from manufacturers' hands there is little or nothing doing, prices being about as low here as in Philadelphia. We reduce our quotations for Oval and Half-round to $105@115;

rods, ⅛@3-16 inch, to $87 50@130; and Hoop to $110@150, cash.

LEAD.—Since our last, Pig has been very quiet, and we hear of none but small jobbing sales; prices are unchanged, and we still quote ordinary Foreign $6 20@6 25 gold. Bar, Sheet, and Pipe, 8c. net cash.

TIN.—Cable advices from London have been received, noting an advance there of £3 on Straits Pig, bringing the price up to £120. This further considerable rise is supposed to have some connection with the approaching Dutch sale, probably the quantity to be offered is below previous expectations; our market responds with a renewal of the activity, a more confident tone, and a general hardening in prices. Sales have been made of 3,500 slabs Straits at 32c.; 250 do., 32¼@32½c. (now held at 32½@33c.); 50 do. Banca, 33½c.; 5 tons English, 30c.; and 19 do., 30½c., all gold. Plates are less active, but the market retains its former improved tone, and full prices are realized; the transactions embrace 500 bxs. Charcoal Tin, at $8 37½c. for I. C.; 500 do. $8 37½@8 50; and 750 bxs. I. C. Coke Tin, 11 by 20, $7 25 all gold.

COPPER.—New Sheathing remains steady at 32c., and Yellow Metal 26c. cash. Ingot is still very dull and unsettled, with much irregularity in prices; the business has been confined to 125,000 lb. Lake Superior at 20¼@20⅝c. A meeting of all the mining and the smelting companies of the country was held here on the 1st inst., to take into consideration the depressed state of this branch of trade. After interchange of views, it was resolved to export during the year not less than 5,000,000 pounds, all pledging themselves to carry into effect this resolution. The stock here is estimated at eleven to twelve million pounds, and it is hoped that this movement will relieve the market and result in more remunerative returns than are now realized.

SPELTER.—Foreign is dull; Silesian is held at 6¼c. gold, without business.

ZINC.—American, dry, 7@7½c.; French, dry, 10¾@11c.; Sheet, 10@10½c.

MANGANESE—Ox. Manganese, 4½@5c. per lb.

Mining Stocks.

NEW YORK, March 4, 1870.

Mining Stocks are somewhat more active at reduced rates. Smith & Parmelee sold to-day, s. 3, at $1 45, and Grass Valley at 30c.

In Petroleum Stocks we have to report more firmness and advanced rates in many instances. United Petroleum Farms sold to-day at 35c. at the Board. The following is the latest list of quotations:

	Bid.	Asked.
Bennehoff	25	35
Bergen Coal and Oil	40	50
Bliven Oil	—	—
Brevoort	1 00	1 50
Buchanan Farm	38	45
Central	65	70
Clinton Oil	—	—
Home Petroleum	4 00	5 00
National	—	—
New York and Alleghany	1 60	—
Northern Light	65	75
Pithole Creek	1 50	1 75
Rathbone Oil	25	35
Ryn l Farm	31	34
Second National	—	75
Phillips	—	—
United Petroleum Farms	35	40
United States	68	75

San Francisco Stock Market.

SAN FRANCISCO, March 2, 1870.

(By Telegraph.)	1st Board.	2d Board.
Savage	34¼	—
Crown Point	—	—
Yellow Jacket	43¾	—
Kentucky	17	—
Chollar Potosi	24	—
Gould & Curry	1 57	—
Ophir	—	—
Alpha	—	—
Belcher	17	—
Imperial	21	—
Hale & Norcross	—	—
Amador	—	—

Dualin.

THIS compound, which, according to its inventor, Mr. DITTMAR, possesses the explosive power of nitro-glycerine, together with the slow combustibility of ordinary gunpowder, consists principally of nitrate of ammonia and fine sawdust, that has been acted upon by nitro-sulphuric acid. This material, according to FUCHS, is undoubtedly endowed with a greater explosive force than ordinary powder; it is also considered as being less dangerous in regard to spontaneous explosion. In its composition it is similar to that of gun-cotton, being also subject to gradual decomposition in moist air. In regard to the efficacy of the dualin, as compared with dynamite, (which is a mixture of nitro-glycerine and infusorial sand) the inventor states that they are both equal in this respect. However, it is extremely difficult to get at comparable results in blasting experiments; in most instances, the experimenter must be satisfied with the average results of a great number of trials undertaken under various conditions. But it is nevertheless easy, in one respect, to fix a difference between the two materials, which leaves no doubt as to the superiority of the dynamite. If equal quantities of dynamite and dualin, provided with primers, are allowed to explode upon air plates of equal strength, the effect indicates such an evident difference, that one must adjudge to the former a much more rapid and violent action. This will certainly be recognized in blasting rocks. In price dualin is cheaper than dynamite. When coming in contact with fire, it will certainly cause explosion, as it burns quite as rapidly as ordinary powder. Of the dynamite, however, it is sufficiently established that it will never explode on holding a flame near it, but simply burn quietly, even if inclosed in strong wooden boxes. Against pressure and concussions, both blasting materials are equally inert, and, finally, dualin possesses the advantage over dynamite that it does not freeze, while the latter, when in a frozen state, cannot be directly exploded. But as blasting is mostly suspended during frost, this circumstance is not of very great importance; moreover, the use of dynamite is not excluded at all, if frozen, as it will readily yield by the explosion of a small cartridge containing non-solidified dynamite. The great superiority of dynamite, above all, consists in its non-liability to become moist; this property allows its direct application under water and in bore-holes, while dualin, like gunpowder, does not bear contact with water.—*Journal of Applied Chemistry.*

The New West.

AN EXPEDITION TO THE BIG HORN MINING DISTRICT.

Colonel LUKE MURRIN, one of the leading merchants of Cheyenne, is in Chicago, engaged in fitting out a large expedition which will start from Omaha and Cheyenne about the 15th of April next, for the Big Horn country, which is situated about three hundred miles north of Cheyenne.

The Chicago *Republican* says the expedition will be composed of about two thousand respectable young men, and will be furnished with four months' rations gratuitously. This expedition will leave under a military commander to be chosen by the members of the association, and will be fully armed for their protection. A military escort consisting of five hundred men will be furnished by the government for the exploration. Governor CAMPBELL, of Wyoming territory, is greatly interested in this movement. He is at present at Washinston, and has succeeded in securing the aid of the government in this matter.

Many of the leading merchants of Chicago, New York, Philadelphia and Boston are interesting themselves in the enterprise, and the strongest hopes are entertained that the experiment will prove successful and profitable to all.

Bessemer's Patents.

Apropos of the recent expiration of the original BESSEMER patent, the London *Mining Journal* says: "Mr. BESSEMER is far too clever a man to allow $120,000 a year, which he gets from royalties alone, to pass out of his hands. Recently he has invented a process by which the waste material that could not be converted into steel shall be converted. As this waste was about 30 per cent., it is manifest that he will be able to undersell all other makers, even though they use his first patent without paying for it. In other words, he will compel them to use his new patent—that is, to continue paying the royalty. Mr. BESSEMER is now a man of enormous wealth, and the conservatory which he has just erected at his seat is probably the finest in the world. Yet it is little more than twenty years since he was a working engineer in North London, who, all his friends declared, would never do anything for himself, because he was always muddling away his time and his money in experiments.

Progress of the Hoosac Tunnel.

WORK on the Hoosac Tunnel is going forward rapidly. During the month of November, the central shaft was sunk thirty feet; but two hundred and sixty-one feet remained unfinished, which, at this rate of progress, will be finished in August next. The machine drills are now working on the east and west faces, and during the month of November, made an average progress of ten feet per day, or two hundred and sixty-two feet for the month. After August, the machines will work on four faces, and, with a progress of twenty feet per day, or six thousand one hundred and forty feet per year, will complete the whole in 1872, thus saving a large amount of interest.

A Good Idea.

BY an advertisement in another column, it will be seen that Mr. E. E. ROBERTS, an educated engineer, has started a somewhat novel, but, it seems to us, highly successful branch of business. He proposes to act as agent for patentees who have valuable inventions, but have failed to hit upon the right parties to furnish capital for their development. The bringing together of brains and money in this respect is still largely a matter of luck; and any man who can introduce into it the system of exchange and agency which is already applied to most kinds of trade, is certainly a public benefactor.

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st.	$2,000,000	$10 00		
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col	P. P. Fullerton, 71 B'way	600,000	10 00		
Atlantic and Pacific	Humboldt Co., Nevada					
Bates and Baxter	Colorado			50 00		
Benton	Colorado	W. F. Drake, 15 Broad	500,000	5 00	05	12
Briggs	Colorado	J. P. Davies, 19 Cliff	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad	2,500,000	100 00	25	40
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau	1,000,000			
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado					
Central Gold					23	25
Consolidated Gregory	Colorado				1 63	1 75
Combination Silver	Nevada			100 00		
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way	5,000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000,000			
Corydon	Gilpin Co., Colorado	J. Samuels, 40 B'way	500,000			
Downieville	Colorado		2,500,000	25 00		
Eagle Gold	Gold Dirt Dist., Col	J. P. Davies, 19 Cliff	300,000	1 00		
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way	1,000,000			
Edgehill		A. Fullerton, 71 B'way	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 13 William	400,000			
Fisk Gold		H. Johnson, 195 Fulton	500,000			
Forest Queen		E. B. Beet, 62 B'way	1,000,000			
Golconda Gold	Sherbrooke, C. E	H. Adams, 71 Broadway	2,000,000			
Gregory	Colorado		1,250,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way	1,000,000	50 00		
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way	3,000,000	10 00		
Gold Rock		R. M. Lockwood, 93 Wall	400,000			
Grass Valley					29	30
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5,000,000			
Holman			2,000,000	25 00		
Kipp & Buell	Colorado		300,000			
Knickerbocker Gold		J. H. Rolston, 80 B'way	200,000	100 00		
La Crosse Gold	Nevada Dist., Col	P. P. Fullerton, 71 B'way	1,000,000		10	13
Lander Hill T. & S	Nevada	M.L.Catherwood,74 B'way	1,000,000			
Lewis Gold	Georgia		1,000,000			
Liberty Gold					1	2
Manhattan Silver	Nevada	M. L. Ogden	400,000			
Maraposa common	California	Jas. H. Ferdon, 34 Wall	12,000,000		8	9⅜
Mariposa preferred	California	do. do.			19½	20¼
Montana Gold		G. De Cordova	400,000		3	
Montana M. L. & M. Co.	Montana	A. M. Hoyt, 22 William	250,000			
Montrose	Clear Creek Co., Col	W. W. Perkins, 71 B'way	1,000,000			
New York Silver	Nevada	Thos. Sproull, 78 B'way	1,500,000			
New York and Austin	Nevada	E. R. Siccomb, 70 Wall	500,000			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 10 Wall	2,000,000		12	
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way	2,000,000			
N. Y. & Utah P. & M		W. H. Mailler, 108 Wall				
Ophir Gold	Comstock Lode, Nev	L. C. Warner, 70 B'way	625,000			
Owyhee Gold		W. H. Smith, 43 Ex. Place	1,700,000			20
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		60	62
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000			
Rocky Mountain	Colorado	S. M. Pond, 70 B'way	500,000	10 00	5	7
Rollins Gold		Thos. Bond, 132 B'way	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad	1,000,000			
Silver Bend		F. W. Macy, 20 Nassau	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way	1,000,000			
Silver Peak & R. M	Nevada	W. B. Ogden, 52 Wall	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad	2,500,000	20 00	1 40	1 50
Social & Steptoe Con		T. H. O'Connor, 24 Nassau	450,000			
Standard Gold		C. B. Bostwick, 169 B'way	500,000			
Symonds Forks						
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau	800,000	100 00		
Texas Gold	Colorado		500,000	10 00		
Union Gold	Colorado	F. A. Potts, 110 B'way	1,200,000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way	300,000			
Wauba Yuma	Arizona	J. W. Sisby, 36 Pine	6,000,000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co		M. A. Myers, 119 B'way	$1,500,000	$25 00		
Ashburton Coal Co		J. T. Rollins, 41 Pine	2,500,000			
Block House Coal		D. B. Keeler, Jr., 43 Pine	1,000,000			
Brewster Iron		H. Robison, 165 B'way	150,000			
Broad Top Coal & Iron Co	Pennsylvania	B. Love	2,000,000			
Cameron Coal Co		J. A. Simpson, 40 B'way	2,500,000			
Carbon Hill Coal Co		J. Silsby, 36 Pine	1,000,000			
Central Coal		F. P. White, 111 B'way	2,000,000	100 00		
Clifton Iron Co		P. H. Riordan, 34 Pine	1,250,000			
Columbia Iron		E. D. Webb, 77 Cedar	1,000,000			
Consolidation Coal	Maryland	J. S. Mackie, 71 B'way	5,000,000			
Crawford Coal		E. Clapp, Prest, 137 B'way	1,000,000			
Cumberland C. & I. Co		E. Riscan, 90 B'way	5,000,000		30 50	32 00
Derby Coal Co		W. S. Davison, 11 Broad				
Dover Coal and Iron Co		L. Chase, 88 Wall				
Del. & Hudson Canal Co		R. H. Nederpol, 7 Nassau	15,000,000	100 00		
Ebervale Coal		G.L Stout, Treas., 111 Br'y	500,000			
Fall River Bituminous		D. T. Brauvelt, 43 Pine	1,000,000			
Farrar Coal		C. H. Jones, 43 Pine	250,000			
Fisher Iron Co		M. Ellis, 19 William	100,000			
Hamp're & Balt. Coal		S. M. Pond, 70 B'way	500,000			
Iron Cliffs Co		C. J. Canda, 52 Wall	1,000,000			
Jackson Iron		G. P. Loyd, 119 B'way	300,000			
Kemble Coal & I. Co		R. A. Wight, 26 Ex. Place	300,000			
Keokuk Coal		J. F. Franklin, 112 B'way	100,000			
Lackawanna I. & C	Pennsylvania	E. C. Lynde, 52 Wall	1,200,000			
Lewis Run C. & I. Co		C. A. Sanborn, 80 B'way	750,000			
Lykens Val. Coal Co		F. A. Platt, 13 William	800,000			
McKean Co. Bit. Coal Co		J. H. Rolston, 80 B'way	1,500,000			
Lehigh & Susquehanna		E. W. Cark, Philadelphia, Pa.			1 00	0 00
Mahanoy			400,000	100 00		
McNeal C. & I. Co		C. C. Godwin, 71 B'way	500,000			
Mount Riga Iron		G. M. Newton, 42 Cedar	300,000			
New Boston Coal		C. H. Ogden, 55 B'way	2,000,000			
N. Y. Con. C. & I. Co		A. T. Levine, 16 Wall				
N. Y. & Lehigh Coal		T. Simpson, 111 B'way	150,000			
Pacific Coal Co		G. Wrighton, 34 Wall				
Peekskill Iron Co		W. Murdock, 7 Nassau				
Pennsylvania Coal Co		E. H. Mead, 111 B'way	3,200,000	50 00		
Richmond Iron Co		A. H. Smith, 165 B'way	1,000,000			
Scotia Coal Co		C. S. Soper, 42 B'way	2,500,000			
Spring Mt. Coal		A. Runyon, 111 B'way	1,250,000			
Springfield & D'p Run C		E. D. Webb, 77 Cedar	600,000			
Stout Coal Co		G. S. Comstock, 111 B'way	500,000			
Susquehanna & Wyoming		E. Potter, 40 B'way	1,000,000			
Tannerdale Coal		C. T. Ludlaw, 71 B'way	250,000			
Wash. Mutual Coal		M. C. Baker, 117 B'way	420,000			
West Point Iron Co		R. C. Brock, 110 B'way	500,000			
Wilkesbarre C. & I. Co		W. H. Tillinghast, 80 Br'y	3,400,000			
Wyoming Val. Coal Co		E. Potter, 40 B'way	1,000,000			

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED
Anita Copper	California	J. A. Ferguson, 8 Wall				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way	$500,000	25 00		
Davidson Copper						
Eagle Harbor Copper	Michigan	W. H. Smith, 43 Ex. Place	500,000	25 00		
Evergreen Bluff Copoer	Michigan	F. W. Caper, 44 Ex. Place	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine	500,000			
Guymard Lead		Samuel Vernor, 38 Pine				
Hilton Copper		W. H. Smith, 43 Ex. Place	500,000			
Hope Copper		J. W. Davis, 19 Nassau	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William	1,500,000			
Indiana Copper Co		J. M. Mills, 25 Nassau	500,000			
Isle Royale Copper	Michigan	F. W. Caper, 44 Ex. Place	1,000,000			
Keweenaw Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000			
Lake Superi'r Silver Lead	Michigan	A. S. Kellogg, 22 Pine	1,000,000			
Omiga Copper	Michigan	S. Cooper, 7 Pine	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P.	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan	J. W. Jones, 6 Broad st,	1,000,000			
St. Marguret Copper		E. P. Sutton, 43 Pine	250,000			
Schoolcraft Copper		R. Walsh, 22 William	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way	500,000			
Union Copper		A. S. Kellogg, 22 Pine	500,000			
Vermont Copper	Vermont	J. C. Ely, 191 B'way	500,000			
Wallkill Lead, asst		S. M. Pond, 70 B'way				

MISCELLANEOUS.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co		W. E. Lawton, 19 Cliff	$1,000,000			
Bigelow Blue Stone Co		H. Bogardus, 14 Pine				
Quicksilver					12½	13
Covill B. L. M. & M'f. Co		C. R. Bostwick, 302 Pearl	250,000			
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co	New Jersey	A. H. Farlin, 61 Malden L'e.	1,500,000			

The Bessemer Process.

THE process of burning out of the impure cast-iron, by a simple blast of air, most of its impurities and the larger portion of its carbon, so as to convert it into good steel, which is called, after its inventor, the Bessemer process, is, without contradiction, the greatest invention of the present century in the domain of the iron industry. Till 1862, there existed some doubt as to its efficiency; and it was, from several quarters, even called a failure; but at the London Exhibition of that year such a display was offered of the capacities of this new and rapid method of treating iron, that since that time many large new establishments have been established, and many old ones adapted to the new method, so that already, in 1866, not less than seventeen large Bessemer works existed in England alone, of which, for instance, the Barrow Hematite Iron Company produced three hundred tons of Bessemer steel per week. The same concern is, in the present year (1870), ready to deliver over one thousand tons per week; while in the whole of Great Britain, at the time of the world's exhibition in Paris in 1867, the annual production was more than one hundred thousand tons. The six Bessemer works in France produced twenty thousand tons, of which fifteen thousand were produced by two firms, the amount of production steadily increasing. In Troy, N. Y., Bessemer works are in operation, producing some five thousand tons per year; and had not an accidental fire destroyed a newly-built extension of the establishment, the production would now be nearly ten times that amount. Some railroad companies in the United States now possess their own Bessemer works, and are substituting durable steel rails for their old, worn-out, and perishable rails of bad English iron, which was formerly in this country used altogether to an unfortunately large extent.

It is confidently predicted by the prominent iron-founders in Philadelphia that cast-iron will go out of use more and more, and almost every thing will be cast of Bessemer steel; the additional expense, if once the works are in operation, being very small, as compared with the enormously increased value of the product.

In Austria, the process has now reached great technical perfection; and it is practiced very extensively also in Prussia. An immense establishment has been founded in Belgium, where mountains of iron ore cover the very surface, beneath which coal is found in many layers to a depth of three hundred to one thousand two hundred feet, and more; and where, for that reason, since many years, a focus of iron industry has been developing. Russia and Italy have already their Bessemer works; and even Spain, since its attempt at self-government, has shown activity in this direction.

The crucibles used in the process are still always the pear-shaped ones, so often described. Usually they contain three tons of cast-iron, but recently they have been made much larger, so as to contain from ten to twelve tons. The reason of this increase in size is that, as in many other cases, the first cost, with the expenses for repair and labor, do not increase in the same ratio as the amount of production; and besides, if operations are undertaken on larger quantities, they become easier, the results are most perfect, and the loss of heat by convection and radiation is proportionately less. Usually the crucible is turned over for pouring out the metal, by means of hydraulic power, working in a piston, similar to steam, the piston-rod being connected with the axis on which the crucible turns.

The choice of the pig-iron to be converted is, as might be anticipated, of great importance. An abundance of silicon and carbon is desirable, as this burns out the silicon to a silicate, which forms a slag; and the carbon to carbonic acid, which escapes in gaseous condition. The combustion of each of these substances goes on vigorously, as long as air is blown through the mass, till the first is entirely, and the second almost entirely, burnt. Then the iron itself commences to show signs of burning, in the abundance of sparks flying out of the crucible, when it is time to stop the operation. Sulphur and phosphorus, on the other hand, are very objectionable, as they can not be burned out by this process. For many purposes, however, as, for instance, in the manufacture of rails, an iron may be used, containing one tenth of one per cent. of phosphorus. In order to give to the pig-iron the necessary amount of silicon and carbon required to adapt it to the successful operation of the Bessemer process, more coal or wood is used in the smelting, and the hot-air blast is applied with a temperature of 500° to 600° Fahr., so as to form a pig-iron rich in the ingredients named.

We give here an interesting analysis, made by VON NEUBERG, of the grey cast-iron before and after the Bessemer process:

100 PARTS OF MATERIAL CONTAINED.	GREY CAST-IRON.	BESSEMER STEEL.
Iron	90.507	99.445
Manganese	3.460	0.139
Copper	0. 85	0.105
Graphite	3. 80	0.000
Carbon (chemically united)	0.750	0.234
Silicon	1.960	0.0 3
Phosphorus	0.040	0.044
Sulphur	0.018	tr ce
	1 0.000	100.000

It appears from this table that the ten per cent. of foreign matter contained in the original pig-iron has been reduced by the Bessemer process to nearly one half of one per cent.; that the graphite has been completely burned out, and also most all the sulphur; that all the phosphorus and copper still remains; that the chemically combined carbon has been reduced to less than one third, and the manganese to one twenty-fourth, while the silicon has almost disappeared, leaving only one thirtieth part of one per cent. To the question what has become of the silicon and manganese, the answer is, that they are in the slag, which is chiefly a silicate of iron and manganese, while, of course, the carbon, graphite, and sulphur have escaped in the gaseous forms of their compounds with oxygen.

It was a few years ago suggested, with a good deal of probability, that many varieties of steel contain nitrogen, and it would not be surprising if, in the Bessemer process, the presence of nitrogen in the air, blown through the melted mass of iron, were found to have another office to perform than that of merely diluting the oxygen, which, if applied in the pure condition, would rapidly burn up all the iron itself. Taking into consideration the later experiments concerning the absorption by palladium of hydrogen, by platinum of oxygen, and the long-recognized strong affinity of red-hot titanium for nitrogen, with which it forms a definite compound of the formula $Ti N_2$, we might look for a similar affinity of iron for nitrogen, causing an absorption or combination of a small amount of this gas during the passage through the iron of the blast of the Bessemer process. The assertion above mentioned, that several superior varieties of steel are nitrogenized, might thus be confirmed. We do not ourselves assert that such is the case, but we call the attention of analytical chemists to the determination of this substance, which, by its peculiar lack of definite properties and reactions, might so easily escape detection; and, in many other cases, actually has eluded the searching tests of experimenters.—*Manufacturer and Builder for February.*

Almost too Much.

A CORRESPONDENT in West Virginia is kind enough to inform us that during the oil excitement, a well was bored by his friends and himself to the depth of six hundred and twenty-six feet, at which point they obtained what the analysts said was platinum. This did not surprise them particularly, since the same hole produced, at four hundred and seventy-six feet, "gold, silver, iron ore, coal, and a host of others." A gentleman, "who was the foreman, quite a geologist and mineralogist," said, if he had that well, he would not want a better fortune! Unfortunately, the tools were stuck in the well, and when, after a year's delay, they were extracted, and the work successfully continued to seven hundred and twenty-six feet, there was a lack of capital, or, in the sweetly simple strain of our correspondent, "the capitalist ceased to pay; and so we stand there now." We can only say, in the words of the bard:

Stand! the ground's your own, my braves!

Nobody wants it, unless it be that gentlemanly mineralogical foreman, who would like no better fortune. Of course, there is no doubt that gold, silver, platinum, iron ore, coal, etc., are all there; the difficulty is, that these substances are refractory, and hard to be extracted by pumping! The capitalist, therefore, in "refusing to pay," was probably only anticipating what the hole, as a whole, would have done.

And now we are overwhelmed by another wonder. A telegram from Louisville announces the discovery of "silver mines of unparalleled richness in Grayson county, Kentucky. The ore is found to contain a larger percentage of silver than any hitherto discovered. The mines are almost inexhaustible. They will be developed in the spring."

A good deal of silver ore has been "hitherto discovered," consisting of pure metallic silver; but this occurrence of a variety containing more than one hundred per cent. of the precious metal, undoubtedly beats the best. We suppose it must embrace a negative quantity of sulphur, or base metal, to make things even. How convenient it would be as a flux for poorer ores! Just feed your furnace with ore containing (we will be moderate) say only fifty per cent. of silver, and add *quantum suff* of this one hundred and fifty per cent. material (one hundred and fifty per cent. is too little; after passing one hundred there is practically no limit—hence, why not one thousand?) and what is to hinder you from tapping the genuine spoon metal, without further ado?

Moral—Draw it mild!

Roofing Slate in Minnesota.

LETTER FROM PROFESSOR ROESSLER.

GEOLOGICAL MUSEUM, GENERAL LAND OFFICE,
WASHINGTON, D. C., Feb. 15, 1870.

TO THE EDITOR: Sir—There has been deposited in this office by the Great Western Mining Company, a sample of roofing slate from Duluth, Minnesota. This beautiful mineral product cannot fail to be of the utmost importance in its vicinity, for all the purposes for which it can be employed, for roofing, for billiard tables, for mantle-pieces, cupboard shelves, bath-tubs, and as a general substitute for sawed marble, it cannot fail to come into very general use. Its fissile character, causing it to split up into convenient thicknesses, will go far to cheapen the cost of manufacture. The color is good, and can be made to harmonize with other mineral materials in construction. The quarries are being opened on the line of the Lake Superior and Mississippi Railroad, between St. Paul and Duluth, Minnesota. The readers of Western travel during the early historic period of Lake Superior remember the Knife Portage across which the Indians carried their canoes, when voyaging between the Great Lake and the Great River. The sharp, knife-like stones, that wounded the Indians' feet, were slate fragments from the beds now being developed. The United States is now almost exclusively supplied with slate from Vermont, Pennsylvania, Canada, or Great Britain. No quarries are operated west of the Alleghanies. These new quarries must therefore become of inestimable value for the cities of the great lakes, and the communities within the Mississippi Valley, where wood for roofing is daily growing more expensive; since into both these districts the slate will be carried by cheap railroad and water transportation. The slate is dark blue, similar to the celebrated varieties of North Wales—is hard, smooth, homogeneous, and easily split into large and very thin pieces. The supply is inexhaustible, and the vertical veins are sufficiently wide to allow a large force of men to work in them.

A. R. ROESSLER.

The New Copper Process.

To the information and explanation given last week concerning Dr. SIERRY HUNT's new copper precipitation process, we add in the present number some further comments by the distinguished patentee himself; and these we would fain complete with an editorial hint as to the possible applications of the process, for which, however, we are also indebted to Dr. HUNT.

It is found easy in practice to keep up the standard of the regenerated bath, by the use of a little sulphurous acid. As might be expected, after the bath is saturated with copper, the protochloride of that metal facilitates the solution of silver or any compound of silver present in the roasted ore. The disulphide of copper, Cu_2S, is also rapidly dissolved. This seems to afford a simple method of handling copper ores which contain both gold and silver, or—what is the same thing in this connection—auriferous argentiferous mattes. These, Dr. HUNT thinks, should be treated as copper ores; and, after all copper and silver have been removed in the bath, the remainder may be treated with mercury or chlorine for the gold. Experiments are about to be made to test the applicability of this plan.

The growing use of pyritic ores in this country in the manufacture of sulphuric acid, imparts especial importance to low-grade pyritic copper ores. The roasting necessary to the manufacture of acid from the ores is the first step also in the manufacture of copper or vitriol; and the residuum of the acid works, which would otherwise be worthless, is made a source of additional revenue by the presence of a very small proportion of copper—much less than would suffice to constitute a profitable copper ore, as such. Thus the poor pyritic ores of Canada are now taken from the province of Quebec to Pittsburgh, Pa., and to Jackson, Mich., to be used in the manufacture of sulphuric acid. They contain from thirty to forty per cent. of sulphur, and from one to five per cent. of copper. The great pyrites mine of the Hudson River Copper Company, on Anthony's Nose, from which thousands of tons are annually shipped to acid manufacturers, has never received, so far as we are aware, payment for the copper in its ores. The profits of the company could be largely increased by the utilization of this material; and all new and cheap methods of copper extraction should have particular attraction for an establishment so situated.

The Zeuglodon.

LETTER FROM PROFESSOR HILGARD.

TO THE EDITOR: Sir—Allow me to correct an error of fact in Professor ROESSLER's article on the geology of Arkansas, published in your paper of November 30, 1869. It is there stated that "it was in Hempstead county that the fossil bones of *Zeuglodon* (a huge Saurian) were exhumed some twenty years ago by Dr. KOCH. From all the bones he could collect (of many individuals) he prepared a restored skeleton, sixty to seventy feet in length, and exhibited it throughout the United States, finally transporting it to Berlin, where it was sold."

In the first place, the *Zeuglodon* has never yet been found in Arkansas; much less, therefore, has any skeleton of the same been compounded from Hempstead county bones. The latter belong to *true* Saurians, chiefly of the Mosasaurus type, characteristic of the southwestern Upper Cretaceous; whereas the *Zeuglodon* is a leading fossil of the middle Eocene Tertiary of Louisiana, Mississippi, and Alabama. It was from the last-named State that the several skeletons of *Zeuglodon*, exhumed and afterwards exhibited, by Dr. KOCH, were obtained. The first of these, after undergoing a round of settled skepticism and animadversion at the hands of sundry authorities in this country, found (together with its discoverer) better appreciation at Dresden and Berlin, at those of GEINITZ, BLUMENBACH, CARUS, JOHANNES MÜLLER, HUMBOLDT, and others. The second is still in this country, and once formed the chief attraction of the St. Louis Museum, and is now at Chicago.

As it is much the fashion in this country to cast a slur on Dr. KOCH, (now deceased), for carrying off the first *Zeuglodon* (after its genuineness had been so assailed as to render it valueless to him), I will here state, for the consolation of all patriots, that there are "a few more left" of the same sort at the disposal of any one possessing zeal and energy equal to that of Dr. KOCH, whose merits as a pioneer naturalist and candid observer will in time come to be appreciated on this side of the Atlantic, as they now are in the Old World.

EUGENE W. HILGARD.

University of Mississippi, Feb. 12, 1870.

The New York Assay Office.

MR. ACTON, late one of the Metropolitan Police Commissioners, has been appointed Superintendent of the New York Assay Office. Mr. ACTON bears a high reputation for executive ability, organizing power, and skill in the management of a large body of men, and the maintenance of discipline and efficiency among them. These qualities will find no sphere of activity in the administration of the Assay Office; and we are equally surprised at the appointment and at its acceptance. There may be logic in putting a man into a novel position because he has done splendid things in a totally different one; but it is a logic too sublime for us to follow. There was a man once, who "thought he could fiddle, though he had never tried." This is more common in politics than in music; and we fear it is encouraged by the fact that so many intuitive fiddlers in that line are invited at once into the orchestra. In the present instance, however, our illustration is perhaps too severe. We esteem Mr. ACTON, and respect his public career, and reverence the condition of feeble health to which his arduous labors have reduced him, too highly to prejudge his course in this new capacity. The government will gain an upright, faithful and intelligent—possibly also, after awhile, an expert—officer in this most important department.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor,

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Cotta on Ore-Deposits.

PROFESSOR BERNHARD VON COTTA, of the Freiberg School of Mines, is the author of the best modern treatise on ore-deposits (*Erzlagerstœttenlehre*); and we are heartily glad that this admirable work has been translated and published in this country. The translator, Mr. FREDERICK PRIME, Jr., a graduate of Freiberg, has had in his work the great advantage of a revision by the distinguished author himself, who declares in a prefatory note, that this may be considered as a new edition (the third) of his own book.

The changes in matter are quite numerous, and sufficiently important to make it advisable for those who possess the latest German edition to obtain this also. It is true that many of them are merely omissions; but these are, in some cases, of positive value, as, for instance, where the sections on certain supposed distributions of rich ores in regular zones have been struck out, as no longer supported by facts. We are not so well pleased to miss the chapters on prospecting and tracing ore-deposits, though these were meagre, and the work of Professor GAETZSCHMANN on that special theme (which, by the way, ought to be translated next) is far more satisfactory. On the other hand, much has been altered or added throughout the book, in order to conform it to the latest results of foreign science and experience. As it now stands, it is calculated to do much good in this country, by clearing away a deal of rubbish from the field of this subject, and sowing the seeds of common sense and scientific accuracy.

Mr. PRIME'S work has been performed, on the whole, with skill and fidelity. We deem it a serious defect in his plan, that he resolved to reproduce merely the treatise of COTTA. The work could be made more valuable by thorough transformation, and the substitution of American examples and illustrations. We trust that Mr. PRIME himself may hereafter be moved to complete the good work he has begun, and really edit, as well as translate, the book before us. It is a stout, healthy stock, and will bear a graft of American science.

We notice some faults of translation, which we shall be so ungracious as to point out, since they can easily be corrected in the subsequent edition, which we hope will soon be called for. They are mainly infelicities or inaccuracies in the substitution of English for German technical terms. Our language scarcely posesses a settled nomenclature of mining, still less of the science of ore-deposits; and in reproducing treatises from so rich a vocabulary as the German, it is necessary frequently to coin new words. But we ought to imitate the Germans in adopting the current miners' terms, wherever it is possible; and certainly we should not misapply terms which have already a fixed meaning. Mr. PRIME'S translation of *Drusenraum* (as applied to a cavity or space in a lode, lined with crystals) by *geode*, instead of *vug*, strikes us as unfortunate, to say the least, The latter word would exactly express his meaning, while the former more properly describes a nodule or boulder containing such a cavity. We must question also the use of the word *fluccan*, to mean a cross-course, or cross-vein. The universal usage in this country applies this term only to softened, decomposed rock or clay, such as frequently occurs on the walls of veins. On the other hand, little use has been made of numerous American terms, already familiar to our mining population, and often exceedingly appropriate and forcible. Such names as *spur, casing, gouge, pay-streak, hill-deposit, cement-deposit, gulch-deposit, prospecting*, and many others, are worthy to be retained. We confess to an affection even for the humorous and descriptive phrase, *to peter out*, as applied to the contraction and final disappearance (*auskeilen*) of a vein. We should prefer *width* or *thickness* to *breadth*, which has been chosen by Mr. PRIME to designate this dimension (*Mœchtigkeit*) of a fissure.

But we need scarcely say that these suggestions are not intended to detract from the really sterling value of this treatise. It is a timely and welcome contribution to the literature of mining in this country; and we are grateful to the translator for his enterprise and good judgment in undertaking its preparation, while we recognize with equal cordiality the liberality of the author in granting both permission and assistance. BERNHARD VON COTTA needs no new laurels from the paths of science; but those which he wears already derive added grace from the genial sympathy with which he extends a hand of help and encouragement to his younger co-laborers and scholars. Every student at the Freiberg school regards with enthusiasm, and every graduate remembers with gratitude, the fraternal interest in his progress manifested by the distinguished men who constitute its corps of instructors; and among them none is more beloved than the brilliant author of the *Gesteinslehre, Geologische Briefe, Gangstudien, Geologie der Gegenwart*, and *Erzlagerstœttenlehre*.

The Formation of a Vessel's Lines.

IT was stated in our last article on this subject, that the fine lines of a vessel, forward and aft, are merely for the purpose of gradually and easily raising the water out of the ship's way, and gradually and easily bringing it back again. What is meant by "the lines" of a vessel is this: The model below water is divided into sections at regular intervals, by horizontal planes parallel to the base line or keel. The boundary of each of these planes forms the "line" at that plane, that at the water level constituting the "water line." It has been for many years the object of naval architects, to give such a shape to these lines as would cause the least disturbance of the water in the passage of the vessel through it. Experiments have passed through various forms, from convex to wedge-shaped bows, until at last the "wave line" of SCOTT RUSSELL has become almost universal.

The object sought is to have the vessel enter the water easily, part it quietly, and pile it up on each side to the least height compatible with the speed. To achieve the latter condition, it is obvious that the water must be forced laterally with at first a constantly increasing speed, and then at a constantly decreasing speed brought to a state of rest, as regards its lateral movement, at the widest part of the hull. The wedge-shaped bow at once starts the water to its greatest lateral speed, and then, the heel of the wedge having been reached, leaves the water with its lateral speed unabated. This, according to the laws governing the movements of liquids, consumes power, which is virtually lost.

The wave line form is produced by laying back to back two parabolic curves, of sufficient length to reach to one-half of the distance allowed for the bow-entrance, and then, by reversing these curves, to form a convex line to the middle body of the vessel. By this line the water is at first parted very slowly, with a gradual and easy lateral motion. As the vessel proceeds, the rapid increase in the width of the bow drives the water with rapidly increasing velocity, until the point of juncture of the concave and convex curves is reached. From this point the speed gradually lessens, until the midship section is reached, where the lateral motion has entirely ceased. The same shape of lines, from the midship to the stern-post, lets the water gently back to its bed, and leaves it in a quiescent state. If this model has been carefully followed, there should be (at the speed for which it was designed) no disturbance on the surface perceptible to the eye of a person standing on the deck; but could a view be taken with the eye at the level of the water, it would be seen that the vessel is upon or in a hill of water, the highest point being at the greatest width, and the inclination gradual from that point forward and aft.

The lines below the water, while retaining the wave-form in general, require to be modified to conform to the decrease in the lengths of the ordinates, caused by the shape of the various cross-sections. The shape or contour of the cross-sections should depend upon the distance above the vertical centre of displacement, at which the power to propel the vessel is applied. For instance, in a sailing vessel, where the centre of effort of the sails is far above the water line, the body lines (which is the technical term given to the contours of the cross-sections) should be so shaped as to resist the downward pressure due to the great height at which the power is applied. This requires a considerable incline to be given from the keel upwards, so as to give a great resistance against the tendency of the power to bury the vessel's bow in the water. Where a paddle-wheel is used, this effect has also to be provided against, though not to so great a degree. In a screw-propeller, the centre of effect of the power coincides so nearly with the centre of displacement, vertically, of the hull, that practically no change need be made in the design of the body plans forward merely to prevent any tendency of the vessel to bury herself. In this latter case, the sides should be brought vertically down to the curve, called the bilge of the vessel, which joins the bottom with the side. The water line of a screw-propeller would then, of course, be exactly similar to all the other lines of the vessel, if only the effect of the propulsion were to be considered. It must, however, be remembered that the motion of the vessel in the sea, the effect of the wind upon her, and other considerations, require to be taken into account, and will cause some slight deviations from this model.

T.

Professor Stapff's Letters.

WE are glad to find that the excellent letters of Professor STAPFF on American iron metallurgy are attracting attention and approval from iron-masters throughout the country. The impracticability of sending the proofs to St. Louis for the author's revision has led to the occurrence of some typographical errors, which will be corrected in his next article. This will conclude the present series, but we shall present our readers hereafter with other and equally valuable contributions from the same able pen.

The Tide Theory of Earthquakes.

RUDOLF FALB, an astronomer of considerable experience and reputation, and editor of the astronomical journal called the *Sirius*, published at Gratz, in Styria, issued last year a work entitled "Fundamental Principles of a Theory of Earthquakes," which created quite a panic in South America, on account of the unpleasant certainty with which it ventured to predict the recurrence of such catastrophes as that which had devastated Chili and Peru but a short time before. We condense from a review in the *European Mail* the substance of his theory, which, it must be admitted, is not wholly unreasonable in itself, and is supported by an array of historico-astronomical calculations which, even if erroneous, can only be refuted by some other equally patient and laborious investigator—we had almost said, by some other German. The author first explains the power and magnitude of the attraction exercised both by the sun and the moon, and how they act under certain circumstances either in the same direction or antagonistically, according to their relative positions at the time of the new and the full moon; for the moon, though of infinitely smaller volume than the sun, plays a much more important part in attracting the waters of our oceans, from being so much nearer to us than the sun. The greatest amount of attraction is exercised on our waters when the sun and the moon are both pulling in the same direction, and when the moon is in her perigee or the point of her orbit nearest to the earth, which is the case at the period of the new moon. Were the oceans covered by a substance of moderate thickness—say of ice—the reaction of the water caused by pressure from being drawn up into a temporary heap by the attraction of the moon passing over it, would be so powerful as to break it up into innumerable small pieces. This may, indeed, have been one cause of the many ruptures in the earth's surface which we witness every day, in all parts of the globe. The author gives a list of the nine principal combinations of force with the moon in perigee or closest proximity to the earth, and the various positions of our globe in reference to the sun; for the moon is at some periods considerably nearer than at others, which of course makes a difference in her power of attraction. BESSEL'S calculation is, that the distance of the moon in her apogee is 54.681 German miles, and in her perigee only 48,020, thus showing a periodical difference of 6,661 German, or about 30,000 English miles. Herr FALB'S theory is, that the attraction of the sun and moon not only exercises an influence on the watery outside covering of our globe, but creates also a tidal wave in the igneous fluid interior, reacting on the inner surface of the crust in the same way as the ocean's surface would react on the supposed covering of ice, and that this causes earthquakes of more or less violence, according to the nature and thickness of the rocks, lifting up the surface as the tidal wave passes underneath, and thus creating the undulatory motion which is the usual characteristic of an earthquake. There must be many places on the surface of our globe where, from various causes, the crust is not so thick as in others, and these are most exposed to the influence of the tidal wave beneath, and consequently most liable to suffer from earthquakes. Moreover, many observations have revealed the fact, that in most cases of earthquake the undulatory motion is from East (subject to some modifications from local and other influences, extending from northeast to southwest) to west, which is precisely the direction it must of necessity take in following the course of the moon. Thus, the great tidal wave that destroyed Arica, on August 13, 1868, travelled in an almost due westerly direction to Port Lyttleton, in New Zealand.

He argues that the most powerful earthquakes must occur at the new or at the full moon, though they are generally anticipated or retarded for several days, by the various positions of the attracting bodies. This theory lends, perhaps for the first time, scientific authority to the supposition of a connection between earthquakes and eclipses, which has hitherto been rated as a groundless superstition. History furnishes numerous instances of their concurrence. This author shows that there was a total eclipse of the moon at the time of the earthquake which occurred when Julius Cæsar was assassinated, March 15, B. C. 44; and his calculations as to the period of the eclipse and earthquake which attended the Crucifixion add new testimony to that of archæology, tradition and Biblical criticism, in fixing the date of that event at April 6, A. D. 31. Of more scientific value are his discussions of the recorded earthquakes of the last twenty years; and here the coincidence between the facts, and the calculated results of his theory is quite striking.

It must be confessed, on the other hand, that Herr FALB has made quite as many failures as successes in seismological prophecy. Yet that is not conclusive against his theory. We should remember that, with all our scientific investigations and our abundant facilities for study of phenomena, we are still unable to bring the theory of ocean-tides into strict accordance with the observed facts. There are so many factors involved—the shape of the ocean-bed; the contour of coasts; the action of storms, trade-winds, and currents; the accumulated results, impossible to analyze or estimate, of former tides and movements; etc., etc. These things complicate the problem so that we cannot yet boast of having given it a complete solution. It is not unreasonable, then, that calculations should fail of absolute accuracy, when applied to a supposed subterranean igneous sea, with its storms and tides, its currents and solid obstructions, all unknown to us.

Important to Miners.

L. B. LYMAN, Esq., Register of the Land Office, has just received a communication from Commissioner WILSON in reference to the rights of persons obtaining mill sites upon placer mining ground where such mines have neither been worked out nor abandoned. It gives some important points, and will be found interesting alike to miners and lawyers. It reads as follows:

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE, Jan. 19, 1870.
REGISTER AND RECEIVER U. S. LAND OFFICE,
HELENA, M. T.

GENTLEMEN—A letter has been received from Messrs. SMITH & CULLEN, attorneys at law, Helena, M.T., requesting information upon the following points:

1. Can a mill site be obtained upon placer mining ground where the same has not been worked out and abandoned?

2. Can a mill site be obtained in connection with a lode which has been previously patented?

In explanation of the first inquiry the writers state that quartz mills are usually located in gulches in order to secure necessary water privilege; that these gulches are frequently not worked out; and under the local usages of miners, other parties have the right to enter upon them for the purpose of mining; and it is in reference to a mill site thus located that the first interrogatory applies; the mill owner, under the local customs, having the right to occupy the site for milling purposes, and other parties for mining.

In the first place, there is no statute authorizing the issue of a patent for a *mill site*, as such. When such a site is used in connection with a mine, in pursuance of a local custom, or State or Territorial law, and is reasonable in extent, it may be patented with the mine as a part of the surface ground allowed for the convenient working of the same. The fact of there being placer gold on the site would not be an obstacle in the way; but the circumstance of some individual or company having located a mining claim upon it, by taking the steps required by the mining regulations of Montana, would prevent the issuing of a patent, unless the mining claim and the mill site claim were held by the same person or persons. Where this is the case, the site may then be patented as a part of the surface ground of a lode claim, provided it is in fact so used or is necessary as such, and is sustained by the local regulations. Whatever is a *bona fide* lode claim, under the local regulations, may be patented under the act of July 26, 1866, and when a mill site constitutes part of such a claim, it may be included in the patent, provided there are no adverse rights to the same. But no patent would be issued for such site, leaving another interest in it, adverse to that of the patentee unadjusted.

2. When a patent has been obtained for a lode claim, and, by inadvertence or misapprehension, the mill site, necessary to the convenient working of the claim, and in fact constituting a part of it under the local regulations, was omitted in making application for patent, and hence not included in the claim, it may be granted in another patent, on the proper application and proof being made, the transaction being a *bona fide* one, and the omission in fact the result of inadvertence or misapprehension as to the rights of applicants under the mining act.

Messrs. SMITH & CULLEN have been furnished with a copy of this communication.

Very respectfully, your obedient servant,
JOS. S. WILSON, *Commissioner.*

The Hoosac Tunnel.

IT appears from the report of a committee of the Massachusetts legislature that up to the 1st of January, 1870, 6,521 feet had been excavated at the east end, and 4,505 at the west end, a total of 11,026, leaving 14,005 to be completed. The central shaft has reached a depth of 708 feet, leaving 232 feet to be bored. The present contractors have done an amount of work but little short of half a million dollars in value. The committee congratulates the State that the tunnel is at last in a fair way to be completed, and that it will be finished within the specified time.

Later advices show that much progress was made in the month of January and thus far in February. The central shaft, 1,000 feet deep, is expected to be completed the coming summer, when work will go on at four faces instead of two as now. The present progress is about 250 feet per month and 1,000 men are employed. The tunnel is nearly circular in form, being 20 feet high in its vertical diameter and 25 feet wide. The drilling is done by the Burleigh drill machines, worked by compressed air, making 250 strokes, and cutting a two-inch hole at the rate of two inches deep per minute. The entire length of the tunnel will be four and three-quarter miles, costing $9,000,000, or $1,900,000 per mile. The Mont Cenis tunnel through the Alps, which will be finished next year, is 7 and 3-5th miles long, the cost of which will foot up $12,000,000, or $1,500,000 per mile.—*N. Y. Stockholder.*

Magnificent Mineral Collection.

A magnificent collection of mineral specimens presented by the Russian government to Columbia College is being unpacked and labelled for exhibition in the mineralogical department of that institution. There are over five hundred different specimens in the collection, including rare pieces of beryl, phenacite, ouvarocite, or chromo garnet, lapis lazuli, Amazon stone, penninite, wolchonskoite, corundum, chrysoberyl and malachite. The work of arranging and labelling is carried out by Prof. EGLESTON in the most perfect manner, better than is the practice in any other school of mines. Each specimen's label bears upon it the name of its species, its chemical composition and crystalline form, so that the student or visitor has the nature of each mineral fully set forth, and can familiarize himself with it without the necessity of reference to catalogues.

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SOLICITOR OF PATENTS
AND COUNSELLOR-AT-LAW.
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Advice in Patent Law given free. mar 8:tf

PUBLICATIONS.

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ARCHITECTURE.

This subject has been treated both as one of the fine arts and as a means of providing shelter for man and his works. Every improvement connected with the art of building, whether that improvement relates to beautifying the appearance, increasing the value, strength, and durability, or lessening the cost of erection, finds a legitimate place in its pages.

THE MOTORS,

Amongst the great agents in the improvement of the arts, none are more important than the Motors—steam, water, and wind. These, in all their various modifications, will receive full attention, and every improvement will be carefully noted and discussed.

SCIENCE APPLIED TO THE ARTS,

As, for example, the application of modern chemical discoveries to dyeing, of electricity to various processes, of magnetism to the examination of iron, have all received attention at the hands of the editors.

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PUBLICATIONS.

THE MINES OF THE WEST:

A REPORT TO THE

SECRETARY OF THE TREASURY.

Being a full Statistical Account of the MINERAL DEVELOPMENT OF THE PACIFIC STATES for the year 1868, with

Sixteen Illustrations,

and a Treatise on the Relation of Governments to Mining, with a delineation of the Legal and Practical Mining Systems of all Countries, from early ages to the present time. By

ROSSITER W. RAYMOND, PH.D.,

U. S. COMMISSIONER OF MINING STATISTICS.

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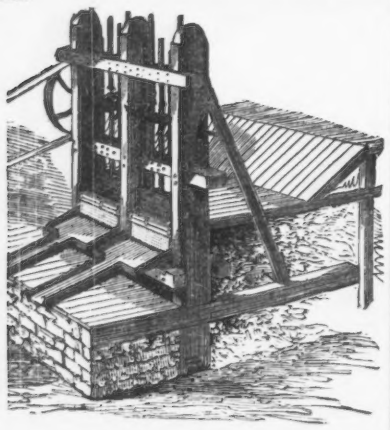

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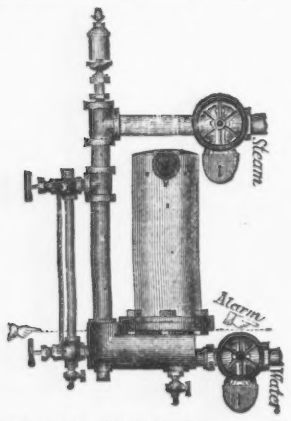

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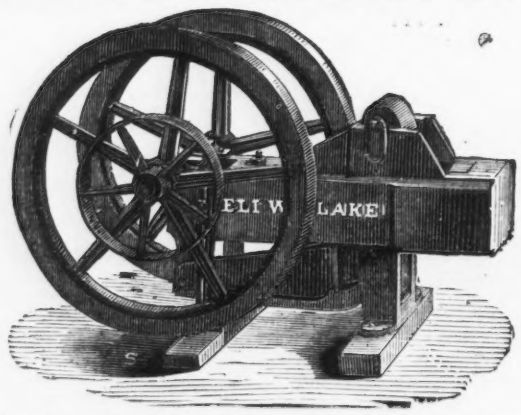

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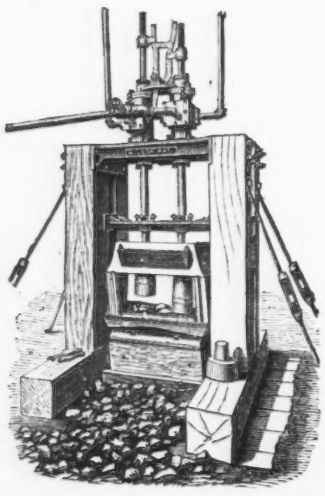

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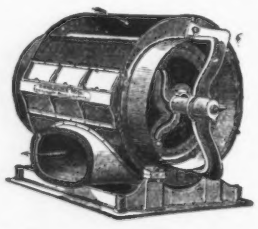

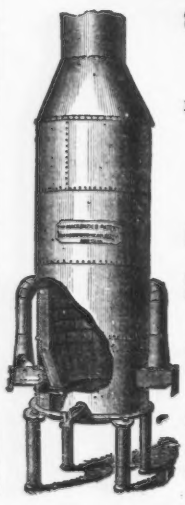

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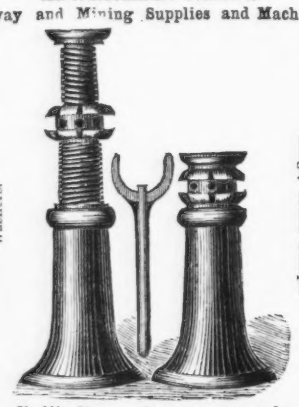

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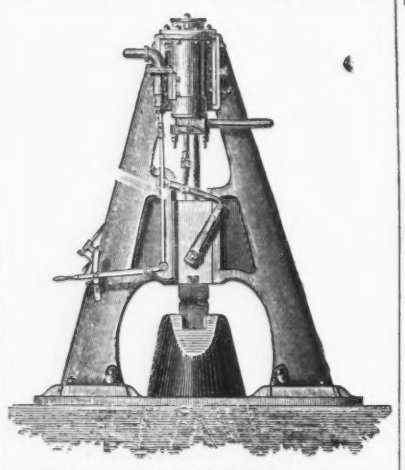

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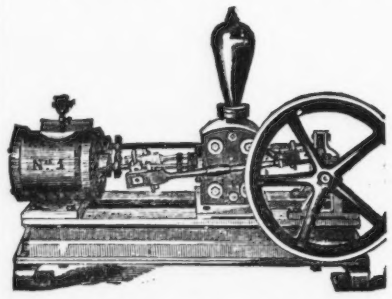

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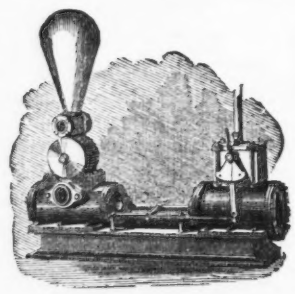

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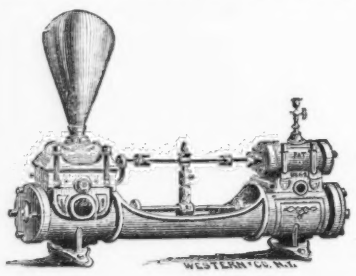

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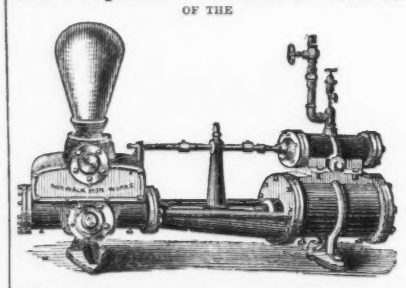

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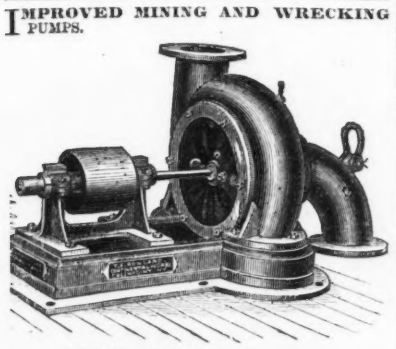

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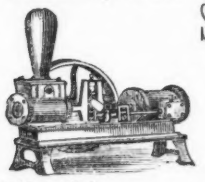

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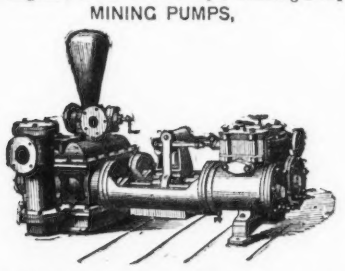

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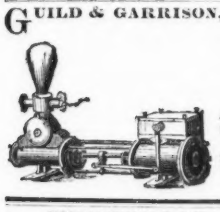

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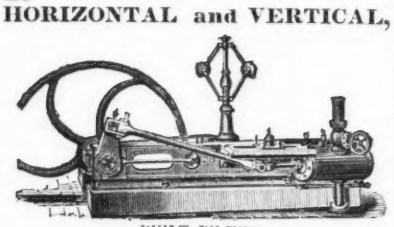

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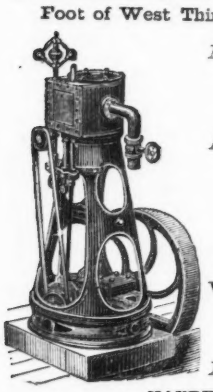

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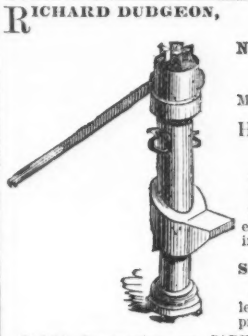

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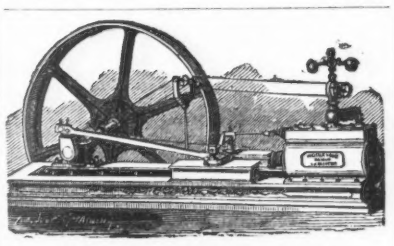

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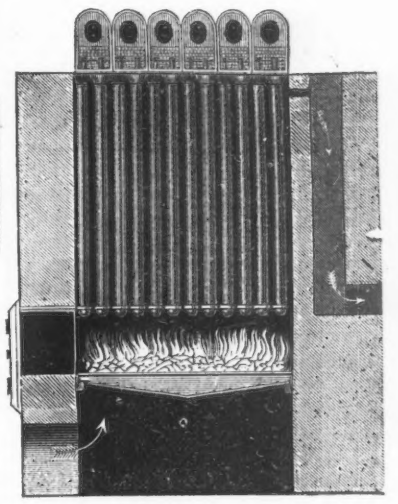

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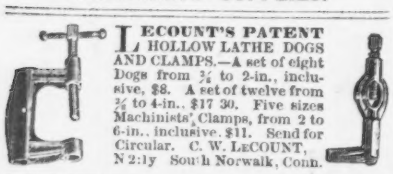

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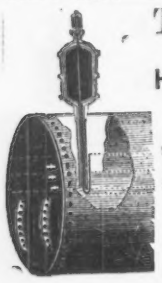

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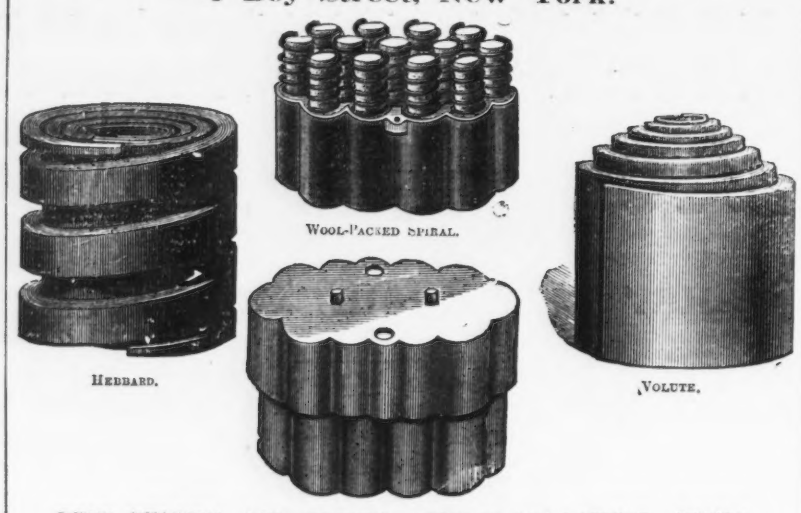

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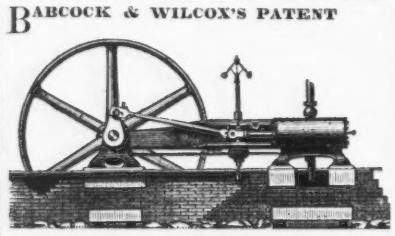

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